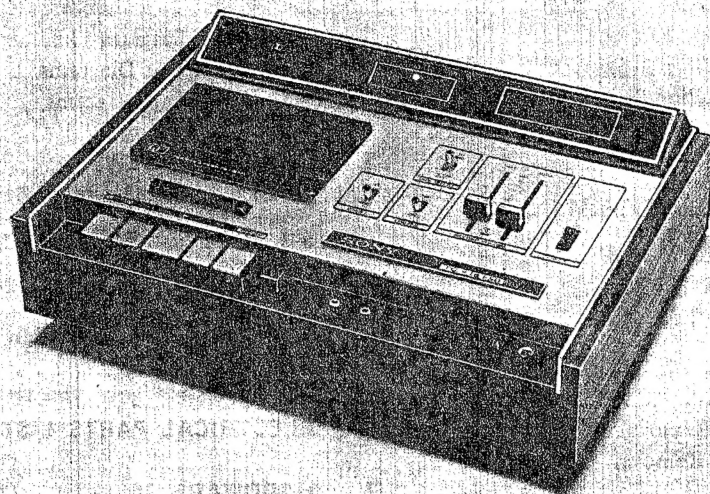


TC-161SD

General Export Model
AEP Model



SPECIFICATIONS

Power Requirements:	AC 110, 127, 220 or 240 V, 50/60 Hz, 25 W (AEP) AC 100, 110, 120, 127, 220 or 240 V, 50/60 Hz, 18 W (General Export)	Outputs:	LINE OUT (two) Impedance : greater than 10 k Ω Output level : 0.78 V (0 dB) with 100 k Ω load
Track System:	Four-track two-channel stereo		HEADPHONE Impedance : 8 Ω Output level : 31 mV (-28 dB)
Tape:	SONY tape cassette or equivalent	REC/PB (DIN) Connector:	Input Impedance : 3.7 k Ω Output Impedance : 7.0 k Ω
Tape Speed:	1 $\frac{7}{8}$ ips (4.8 cm/s)	Semiconductors:	2 FET, 40 transistors and 30 diodes
Recording Time:	2.0 hrs total (with cassette C-120)	Motor:	HC-414 B (hysteresis motor)
Frequency Response:	NAB 20 ~ 17,000 Hz with chromium dioxide cassette 20 ~ 15,000 Hz with ordinary cassette DIN 40 ~ 15,000 Hz with chromium dioxide cassette 40 ~ 12,500 Hz with ordinary cassette	Record/Playback Head:	PF 133-3602 (1 k Ω /1 kHz)
Signal-to-Noise Ratio:	49 dB (DOLBY switch OFF) With DOLBY switch ON, S/N improves 5 dB at 1 kHz and 10 dB at 5 kHz.	Erase Head:	EF 110-36E (400 Ω /50 kHz)
Wow and Flutter:	0.1 % WRMS (weighted root mean square) (\pm 0.3 % DIN)	Dimensions:	15 $\frac{3}{4}$ (W) x 5 (H) x 10 $\frac{7}{8}$ (D) (400 x 127 x 276 mm)
Recording Bias Frequency:	Approx. 85 kHz	Weight:	14 lb 4 oz (6.6 kg)
Inputs:	MICROPHONE(two) Impedance : low impedance Maximum sensitivity : 0.2 mV (-72 dB) LINE IN (two) Impedance : 100 k Ω Maximum sensitivity : 60 mV (-22 dB)		

SONY®
SERVICE MANUAL

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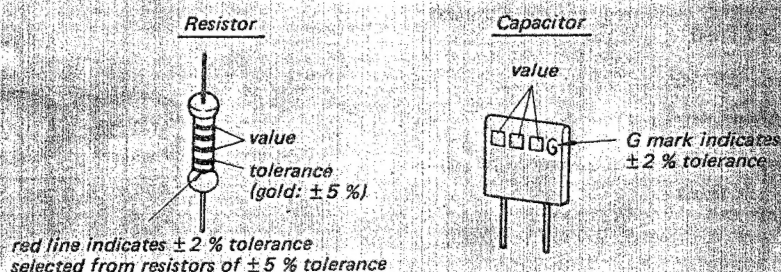
When ordering replacement parts, use PART NUMBERS listed in Parts Lists or shown in EXPLODED VIEWS.
Parts List reference numbers should not be used.

All screws in this service manual are Phillips type (cross recess type) unless otherwise indicated.
(-) : slotted head

CAUTION

1. Record and playback level adjustments should be carefully made. The levels must be as specified for correct DOLBY circuit operation.
2. When replacing resistors and capacitors needing $\pm 2\%$ tolerance, use only those with red line or G mark, as DOLBY system requires precise circuit operation.

$\pm 2\%$ Tolerance Identification



SECTION 1

OUTLINE

1-1. DOLBY NOISE REDUCTION SYSTEM

1. OUTLINE

The TC-161SD uses a DOLBY NOISE REDUCTION system to reduce hissing noise during low level or zero level sound passages. This system pre-emphasizes the low-level high-frequency recorded signals which are disturbed by hissing noise. During playback, it de-emphasizes these signals along with tape hiss and thus improves signal-to-noise ratio.

- (1) The DOLBY system differs from other noise reduction systems as follows:
 - * High-fidelity sound cannot be obtained if the DOLBYIZED tape is played back on other systems or vice versa.
 - * Signal levels must be precisely adjusted since these levels control the DOLBY system.
- (2) The DOLBY system of the TC-161SD has the following features:

The DOLBY unit (DCB-020) contains a variable high-pass filter controlled by input level. During Record:

The DOLBY unit (DCB-020) is series-connected to boost the low-level high-frequency signal.

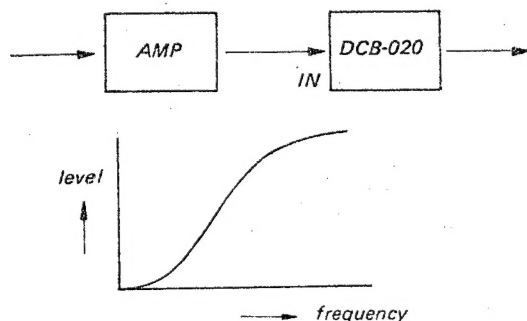


Fig. 1-1. Unit connection in record mode and frequency response

During Playback:

The DOLBY unit is connected as a negative feedback circuit to decrease the gain for low-level high frequency signals boosted during record.

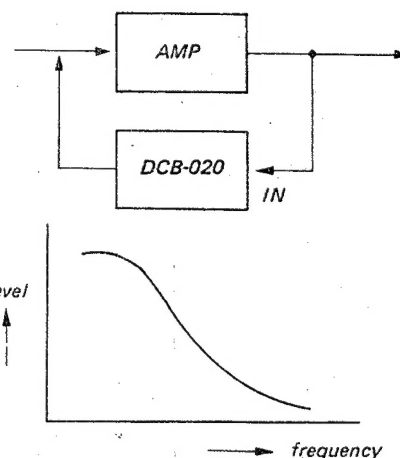


Fig. 1-2. Unit connection in playback mode and frequency response

2. CIRCUIT OPERATION

(Refer to schematic diagram on page 30)

Stage/Control	Function
R501, R502	These resistors attenuate signal level 20 dB. High resistance value is due to high output impedance of LINE OUT jack since DOLBY unit input is connected to LINE OUT jack.
Q501	This emitter-follower amplifier is an impedance-translator for the low-impedance high-pass filter.
filter C503, C504, C505 R509, Q502	Q502 changes the filter curve determined by C503, C504, C505 and R509.

<p>Q502: OFF</p>	<p>Attenuation at 10 kHz: 6 dB</p>
------------------	--

1-2. SYSTEM CONTROL CIRCUIT DESCRIPTION (Refer to schematic diagram on page 6.)

The TC-161SD uses two automatic stop mechanisms;

1. In playback, record, rewind or fast forward mode, SONY Magnetodiode * detects reel spindle stop at tape end and operates tape stop mechanism.
2. In rewind mode, switch built in tape index counter operates tape stop mechanism, at 000 counter reading.

*: The diode developed by SONY is extremely sensitive to magnetic field.

Automatic Stop Function at Tape End

In playback, record, rewind or fast forward mode:

1. Ferrite magnet ring belt-driven by supply reel spindle rotates.
2. Magnetodiode D401 detects magnetic field variation produced by ferrite magnet ring rotation as an AC signal.
3. The AC signal is amplified by transistors Q401 and Q402, and rectified by diodes D402 and D403.
4. Rectified DC voltage charges C405 and charging current flows through C405 and R413 since the rectified DC voltage is higher than B + voltage divided by R412 and R413.
5. Rectified DC voltage turns Q404 ON and decreased collector voltage of Q404 turns Q405 and Q406 OFF.
6. Solenoid PM 1 remains de-energized.

At tape end:

1. Ferrite magnet ring stops.
2. D401 detects magnetic field variation stop.
3. Due to no AC signal input to Q401, current flow to D403 stops.
4. C405 discharges through R419, Q404 emitter and R429.
5. After the discharge, Q404 turns OFF and conducts Q405 and Q406.

Note: In playback, record, rewind or fast forward mode, S3-4, S13 or S14 ground DC bias supply circuit used for Q404 base.

6. Solenoid PM 1 is energized and stops tape transport mechanism.

Starting:

1. In stop mode, DC bias is applied to Q404 base through R417, R418 and R419 and Q404 turns ON.
2. With forward, rewind or fast forward button depressed, ferrite magnet ring starts to rotate and turns Q404 ON before S3-4, S13 or S14 ground DC bias supply circuit used for Q404 base.
3. Solenoid PM 1 remains de-energized.

Manual Stop Function

1. With STOP button depressed, S11 closes. Voltage across C405 increases and charging current flows through C405.
2. This charging current decreases Q404 base voltage.
3. Q404 turns OFF, solenoid PM 1 is energized and stops tape transport mechanism.

Manual Pause Function

1. With PAUSE button depressed, S12 closes and supplies bias voltage to Q404 base through R414 and R419.
2. Q404 turns ON and solenoid PM 1 remains de-energized.

Memory Counter Stop Function

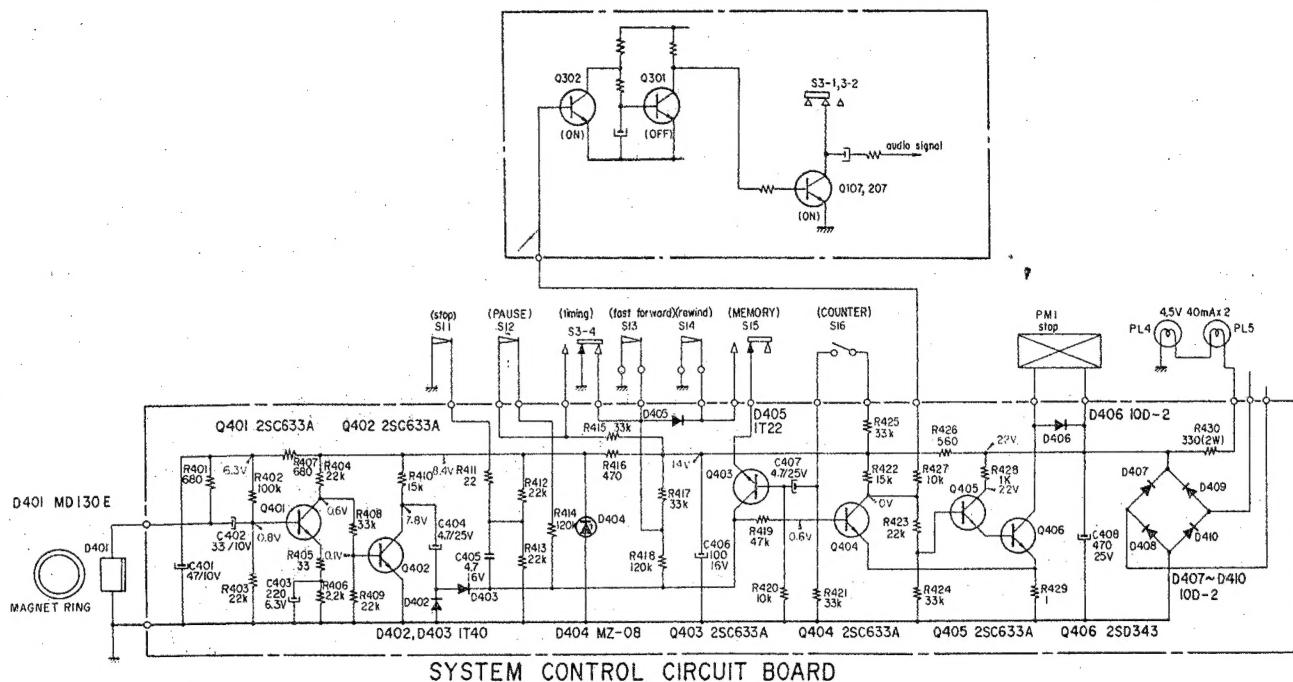
In rewind mode, tape transport automatically stops when tape index counter indicates 000. This function is useful for repeated playback of desired tape portion.

1. When tape counter indicates 000, S16 closes and turns Q403 ON during charging of C407. Then Q404 base bias is grounded through Q403, S15 and S14 Solenoid PM 1 is energized.
2. D405 operates the memory counter system only in rewind mode.

Muting Circuit

When STOP button is depressed, muting circuit eliminates click noises as follows:

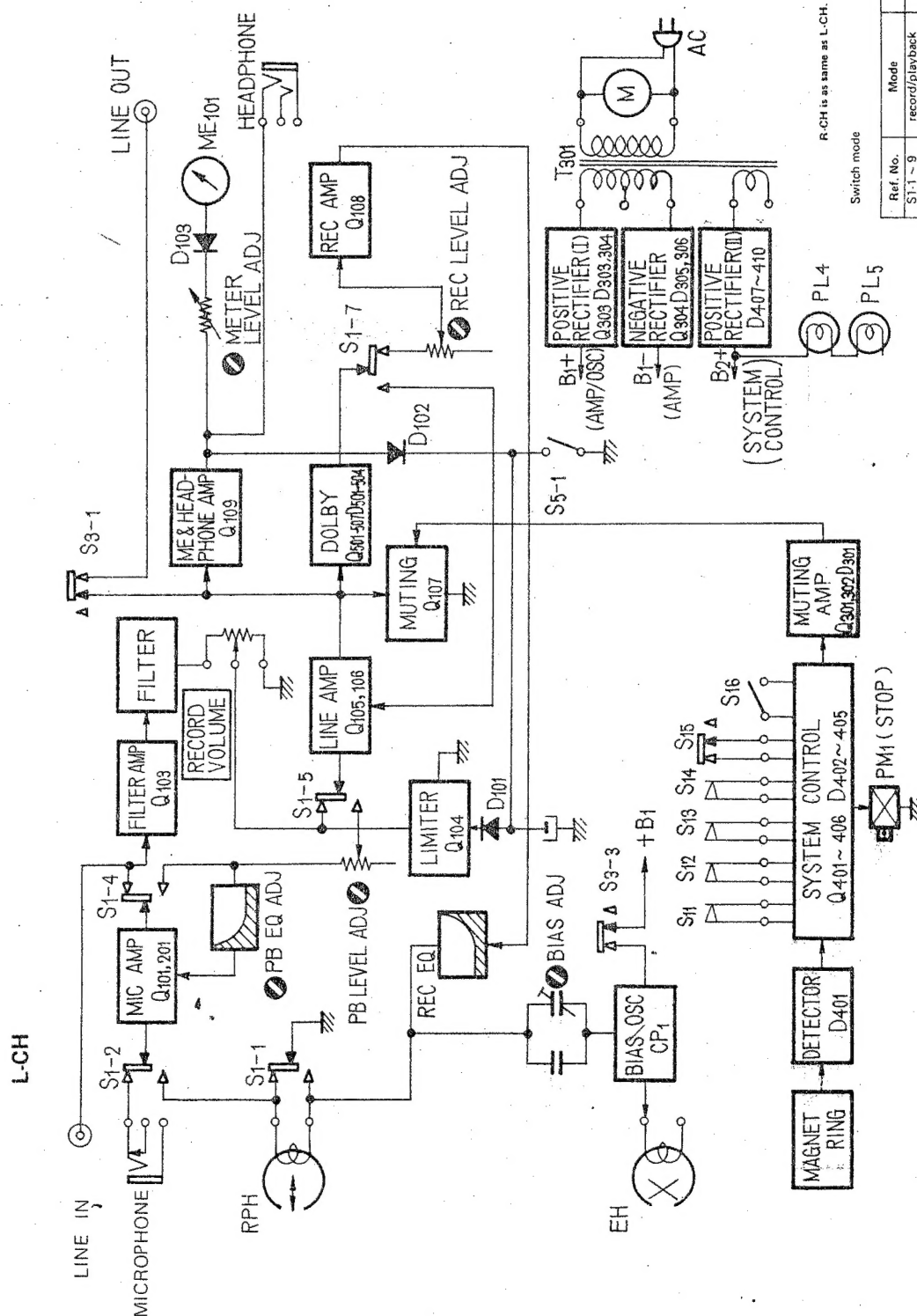
1. STOP switch (S11) closes and turns Q404 OFF.
2. Increased collector voltage of Q404 turns Q302 ON.
3. Q301 turns OFF.
4. Q301 collector voltage becomes higher than zener voltage of D301 and turns Q107 and Q207 ON.
5. Q107 and Q207 ground audio signal circuits, thus click noises are eliminated.



TROUBLE SHOOTING

Symptom	Cause
No automatic stop at tape end.	<ol style="list-style-type: none"> 1. Timing switch (S3) defective. 2. Fast forward switch (S13) defective. 4. Rewind switch (S14) defective. 5. Solenoid defective. 6. System control circuit board defective.
Automatic stop during tape movement.	<ol style="list-style-type: none"> 1. D401 incorrectly positioned. 2. No magnetic ring rotation. (caused by belt slip)
Automatic stop in PAUSE mode.	<ol style="list-style-type: none"> 1. SMD incorrectly positioned. 2. PAUSE switch (S12) defective.
Function buttons fail to lock.	<ol style="list-style-type: none"> 1. D401 defective. 2. Magnetic ring loose.
Automatic stop after any function button locks.	<ol style="list-style-type: none"> 3. D402 defective. 4. System control circuit board defective.
MEMORY COUNTER inoperative.	<ol style="list-style-type: none"> 1. MEMORY switch (S15) defective. 2. Solenoid defective. 3. COUNTER switch (S16) defective.

1-3. BLOCK DIAGRAM

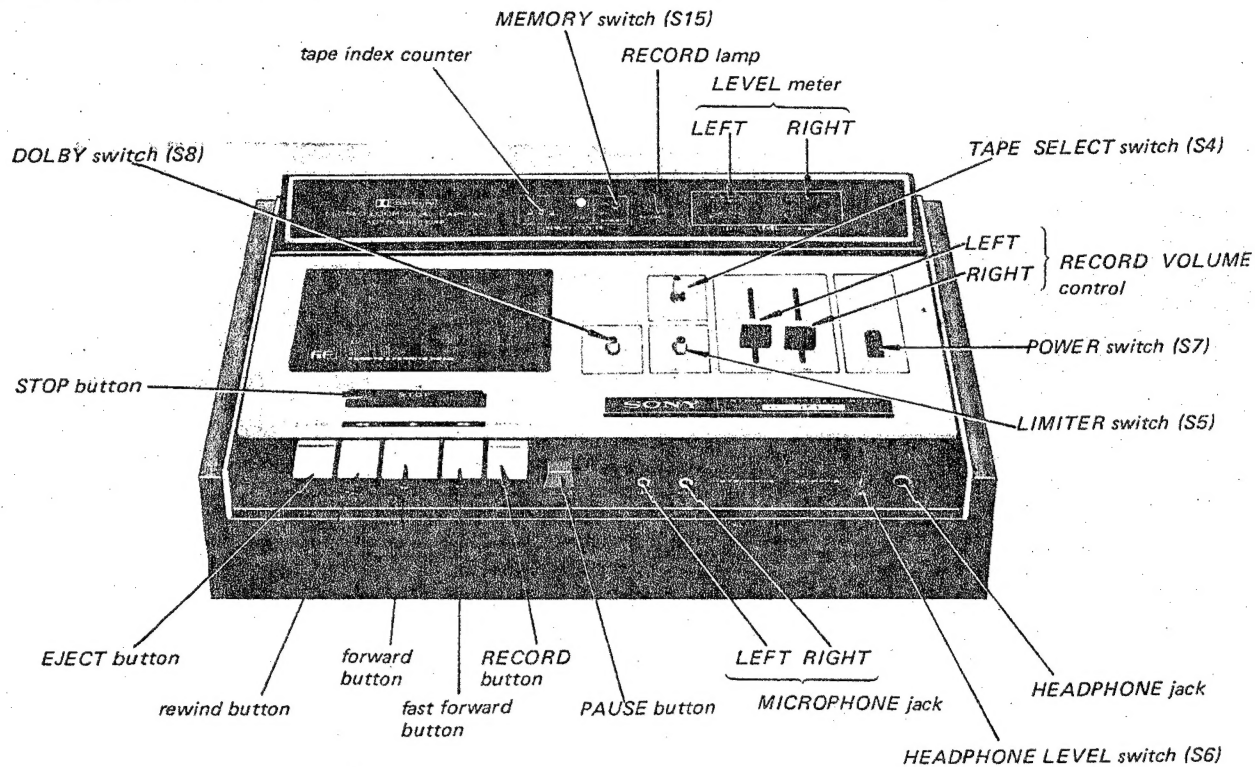


R-CH is same as L-CH.

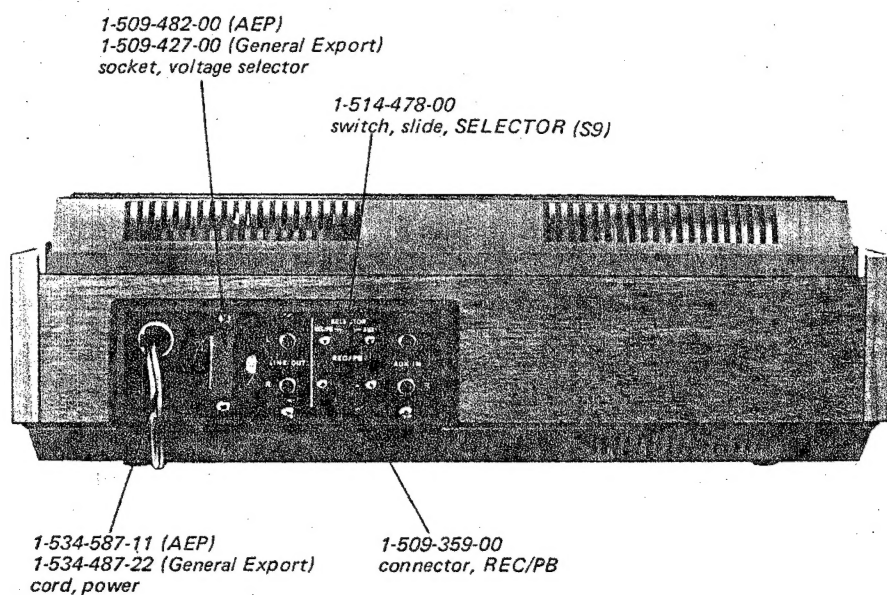
Switch mode

Ref. No.	Mode	Switch
S1-1 ~ 9	record/playback	record
S3-1 ~ 9	timing	record
S5-1	LIMITER	ON
S11	stop	OFF
S12	PAUSE	OFF
S13	fast forward	OFF
S14	rewind	OFF
S15	MEMORY	OFF
S16	COUNTER	OFF

1-4. CABINET FRONT VIEW



1-5. CABINET REAR VIEW



1-6. CHASSIS TOP VIEW

COUNTER switch (S16), included in tape index counter

1-516-133-00 switch, slide; MEMORY (S15)

1-516-128-00 switch, lever slide; TAPE SELECT (S4)

1-514-472-21 (AEP)
1-514-655-31 (General Export)
switch, seesaw; POWER (S7)

R231 } 1-222-455-00
R131 } resistor, variable;
20 k Ω (A)

1-516-126-00 switch, lever; DOLBY (S8)

1-516-126-00 switch, lever; LIMITER (S5)

1-514-415-21 switch, slide; HEADPHONE LEVEL (S6)

1-7. CHASSIS BOTTOM VIEW

X-35316-54-0
mounted circuit board, TAPE SELECT switch

1-516-134-00 switch, leaf; fast forward (S13)

1-532-079-00 fuse, 160 mA (F5) (AEP)

1-514-472-21 (AEP)
1-514-655-31 (General Export)
switch, seesaw; POWER (S7)

1-514-880-00 switch, leaf;
rewind (S14)

X-35316-52-0
mounted circuit board,
bias osc

1-532-284-00 fuse, 630 mA AT (F4) (AEP)

1-532-275-00 fuse, 160 m AT (F2) (AEP)

1-532-275-00 fuse, 160 m AT (F3) (AEP)

X-35133-52-0
mounted circuit board,
DOLBY

X-35316-55-0
mounted circuit board, filter

X-35316-51-0
mounted circuit board, audio amp

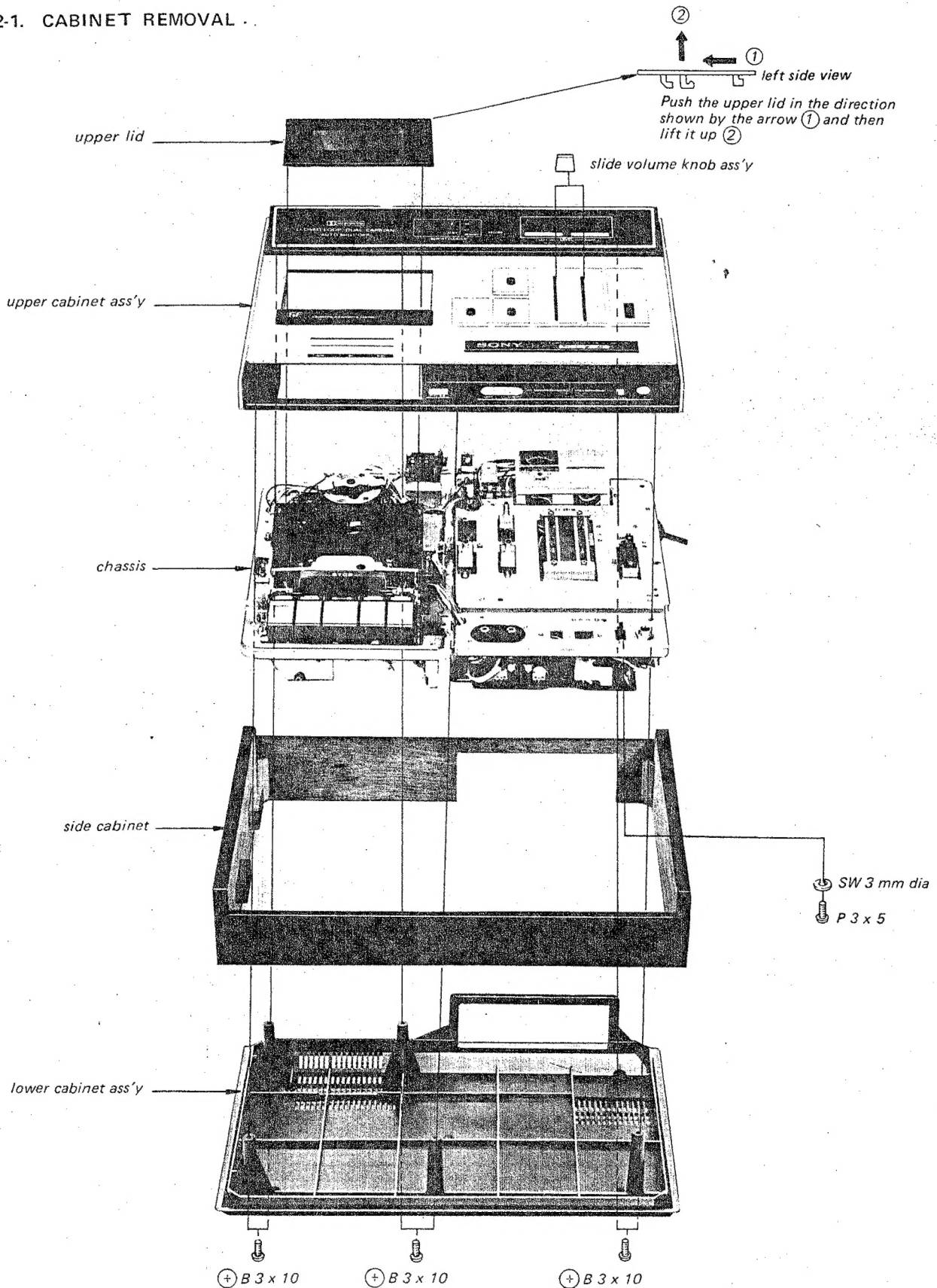
X-35316-53-0
mounted circuit board,
system control

1-514-266-00 switch, leaf; PAUSE (S12)

TC-161SD

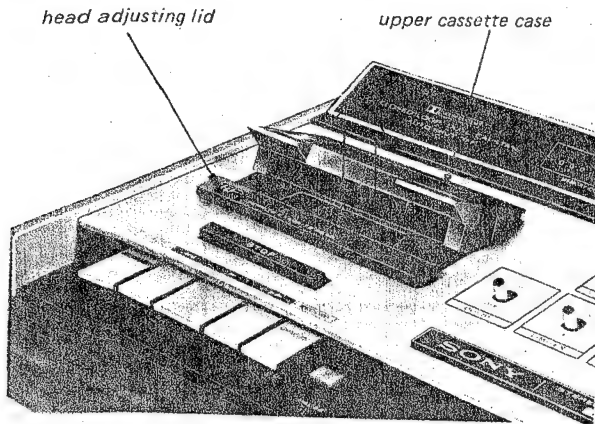
SECTION 2 DISASSEMBLY

2-1. CABINET REMOVAL



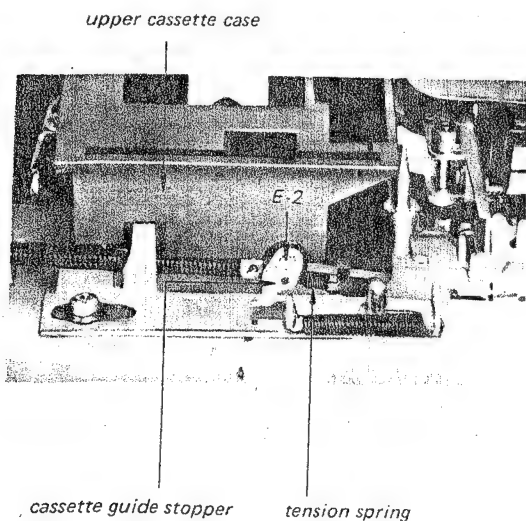
2.2. HEAD ADJUSTING LID REMOVAL

Remove head adjusting lid by pulling in the direction shown by the arrow and record/playback head azimuth adjustment can be made.



2.3. UPPER CASSETTE CASE REMOVAL

- (1) Remove retaining ring (E-2).
- (2) Remove tension spring.
- (3) Remove cassette guide stopper.
- (4) Remove cassette case in the direction shown by arrow.



CAUTION

1. Head Deck Stopper

Remove the stopper only when necessary. Slight movement of the stopper may badly affect tape path. When removing the stopper, perform "Timing Switch (S3) Adjustment" on page 14.

2. Left Pinch lever Assembly and Record/playback Head

Do not replace left pinch lever assembly and record/playback head at the same time. If necessary, replace one part only and adjust it in reference to the other.

Note: Refer to Tape Path Adjustment on page 19 and Head Height Adjustment on page 20.

After tape path parts replacement or tape path adjustments, perform the following adjustment and measurements:

1. Azimuth Adjustment on page 20.
2. Overall Frequency Response Measurement on page 24.
3. Erase Ratio Measurement on page 25.
4. Cross-talk Measurement on page 26.

3. Tape Tension Check (After flywheel replacement)

1. Prepare alignment tape cassette (See "how to make an alignment tape cassette" on page 19) and load it in the unit.
2. Place unit in forward mode.
3. Turn the power switch off and depress PAUSE button.
4. Slacken the tape by approximately 10 mm ($\frac{3}{8}$ ") between left pinch roller and erase head.
5. Release PAUSE button and turn power switch on.
6. Make sure that tape recovers normal tape tension within two minutes.
7. If necessary, replace the other flywheel.

Note: When two flywheels with the same diameters are used, take-up capstan rotates slightly faster than supply. If the diameter of supply flywheel is slightly smaller than take-up, slack tape will not recover the normal tape tension.

8. Repeat steps 1 through 6, after replacing flywheels.

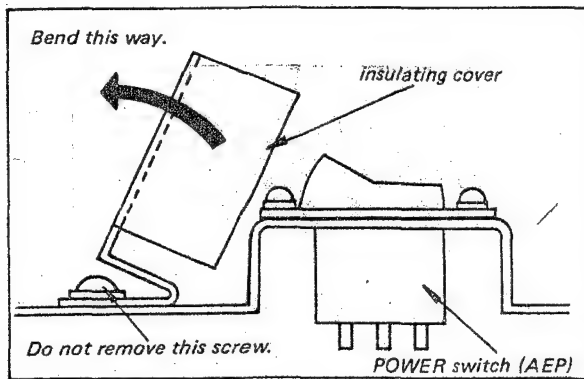
Note: Do not spill oil on the belt nor twist the belt.

TC-161SD

4. POWER Switch (AEP) Replacement.

Proceed as shown.

(Do not remove insulating cover.)



SECTION 3 ADJUSTMENTS

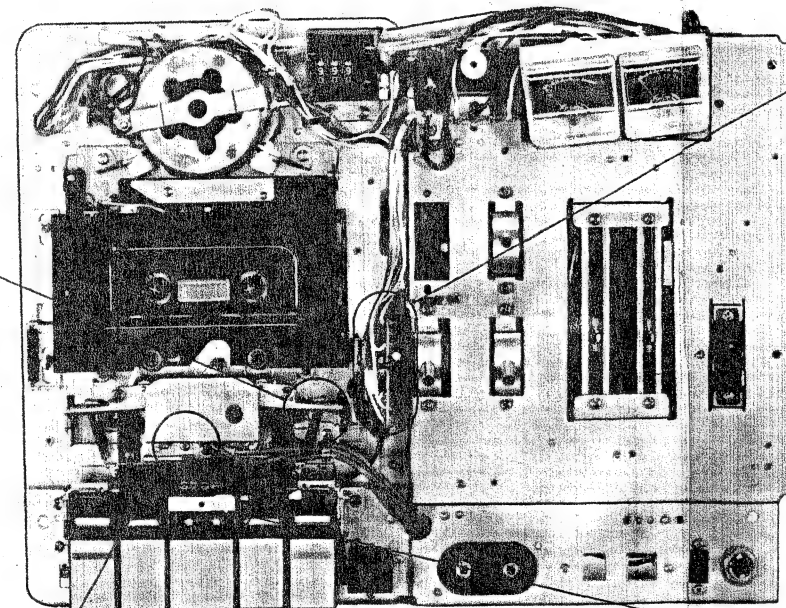
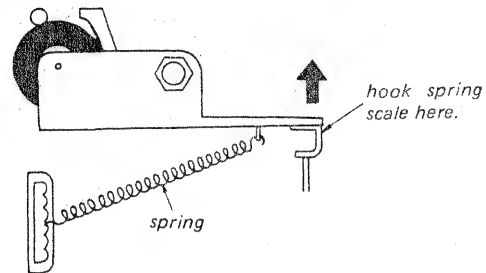
3-2. MECHANICAL ADJUSTMENTS

Pinch Roller Pressure Adjustment — playback mode —

1. Separate pinch roller from capstan by spring scale as shown.
2. When spring scale tension is released, pinch roller approaches capstan. Observe pressure reading when pinch roller makes first contact with capstan.

Specification: 140 ~ 170g (4.94 ~ 6.0 oz)

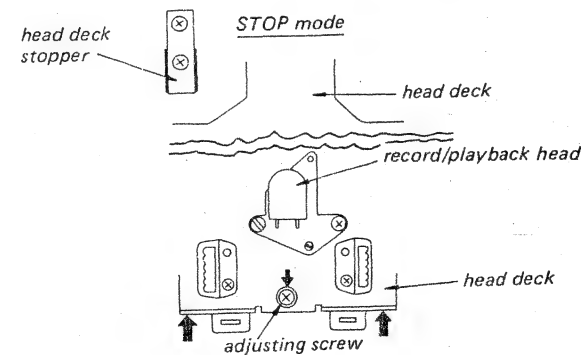
Note: If specified value is not obtained, change spring hooking position.



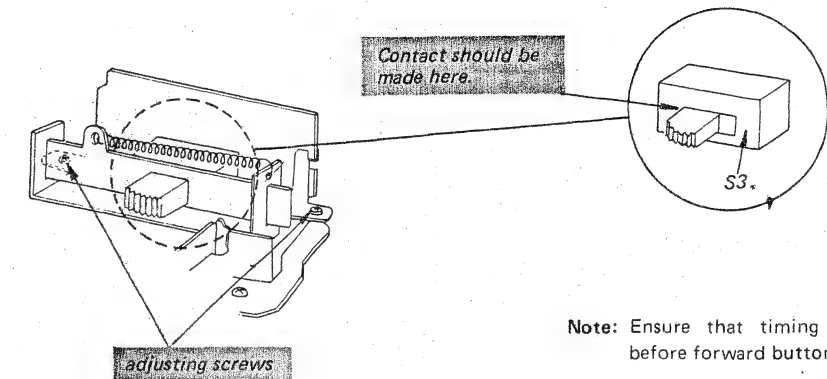
Head Deck Stroke Adjustment — STOP mode —

1. Loosen the adjusting screw and push head deck until it stops at head deck stopper.
2. Pushing the screw in the direction shown by arrow, tighten it.

Note: Slowly depressing forward button, it should be locked when head deck contacts head deck stopper. Forward button has a little play after it is locked.



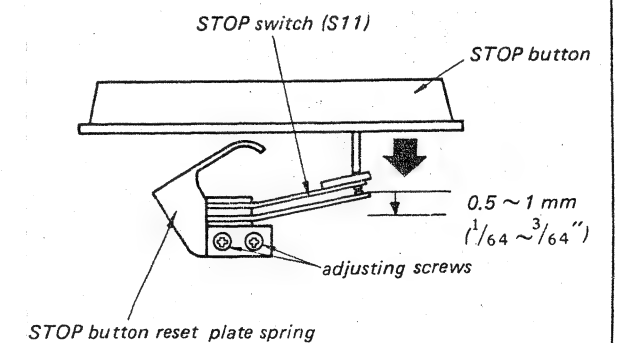
Timing Switch (S3) Adjustment — playback mode —



Note: Ensure that timing switch (S3) turns before forward button is locked.

STOP switch (S11) Position Adjustment — STOP mode —

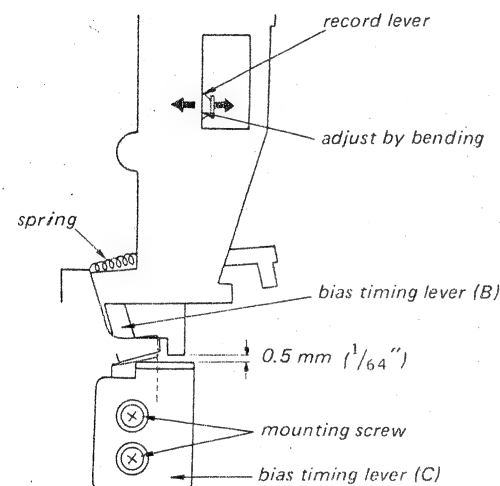
When STOP button is locked, STOP switch (S11) should bend 0.5 ~ 1 mm ($1/64 \sim 3/64$ ")



Bias Timing Adjustment — RECORD mode —

1. When STOP button is slowly pushed, record button should be released after forward button is released. If necessary, proceed as follows.
2. Adjust the position of bias timing lever (C) by loosening the mounting screws so that the clearance between bias timing lever (B) and bias timing lever (C) is 0.5 mm ($\frac{1}{64}$ " in record mode.
3. Bend record lever so that the tip of bias timing lever (B) meets the center position of bias timing lever (C) as shown. If necessary, replace spring.

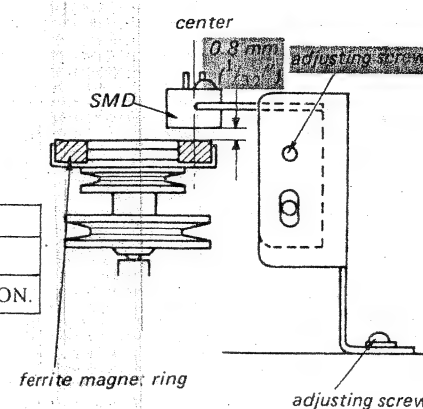
Note: If specified position is not obtained, a click noise will be recorded on the tape.



SMD Adjustment

Note:

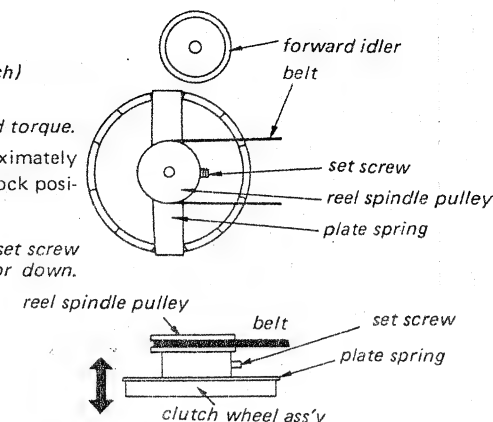
clearance	Symptoms
more than 0.8 mm	autostopped near tape end
less than 0.8 mm	autostopped with PAUSE button ON.



Playback Torque Adjustment — playback mode —

Playback torque with torque meter.
Specifications: 45 ~ 55 g · cm (0.63 ~ 0.76 oz · inch)
If necessary, proceed as follows.

1. Change lock position of plate spring for specified torque.
Note: Playback torque changes approximately 5 g · cm (0.07 oz · inch) each lock position.
2. If satisfactory results cannot be obtained, loosen set screw and adjust by moving reel spindle pulley up or down.

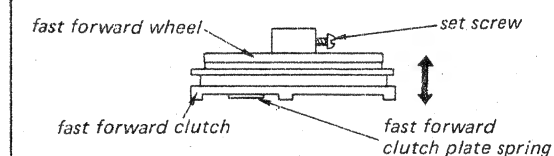


Fast Forward and Rewind Torque Adjustment — fast forward and rewind mode —

Specifications: fast forward; more than 70 g · cm (1 oz · inch)
rewind; 80 ~ 100 g · cm (1.1 ~ 1.4 oz · inch)

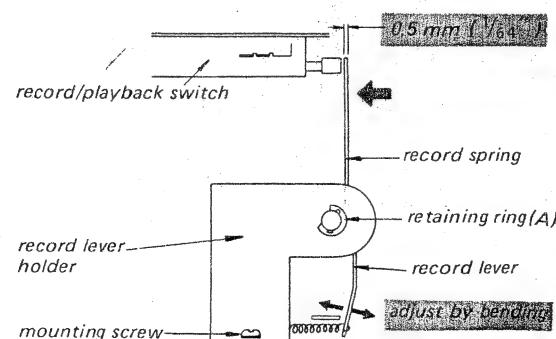
If necessary, proceed as follows:

1. Loosen set screw and adjust by moving fast forward wheel up or down for specified torque.
2. If satisfactory results cannot be obtained yet, adjust by changing locking position of fast forward clutch plate spring.



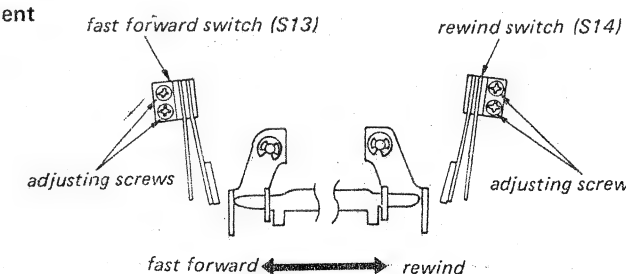
Record Lever Adjustment — STOP mode —

- Note:**
1. This adjustment should be made after removing record lever holder by removing retaining ring (A).
 2. When RECORD button is locked, there should be no clearance between record spring and record/playback switch.



Fast Forward and Rewind Switch (S13, S14) Adjustment — fast forward and rewind modes —

Turn adjusting screws so that fast forward switch and rewind switch close and switch leaves further bend 0.5 ~ 1 mm ($\frac{1}{64}$ ~ $\frac{3}{64}$ ").



Back-Tension Torque Measurement

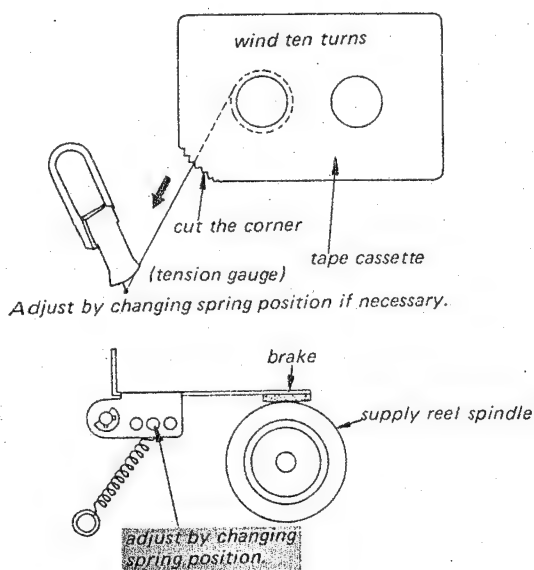
— playback mode —

1. Cut corner of tape cassette as shown.
2. Load cassette and set to playback mode with no ac power input.
3. Lock PAUSE button.
4. Tie the tape to the end of tension gauge and pull horizontally in the direction shown by arrow at a speed of 4.8 cm/s.

back-tension torque = (reading on tension gauge) \times 1.1

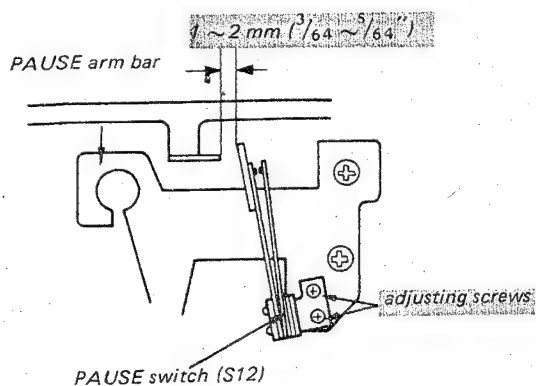
Specifications: 10 ~ 15 g \cdot cm (0.14 ~ 0.21 oz \cdot inch)

Specifications for rewind back-tension:
less than 12 g \cdot cm (0.17 oz \cdot inch) (no adjustment)



PAUSE Switch (S12) Adjustment

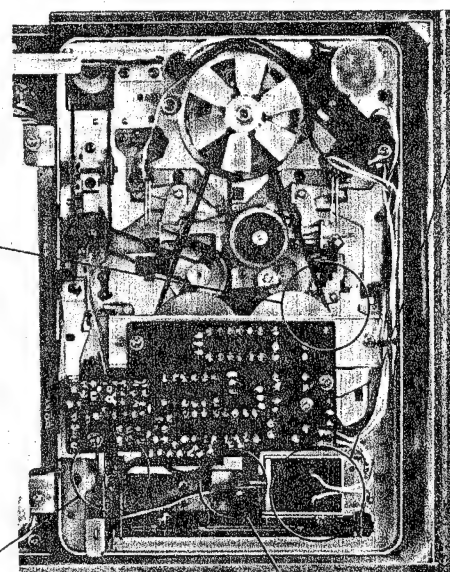
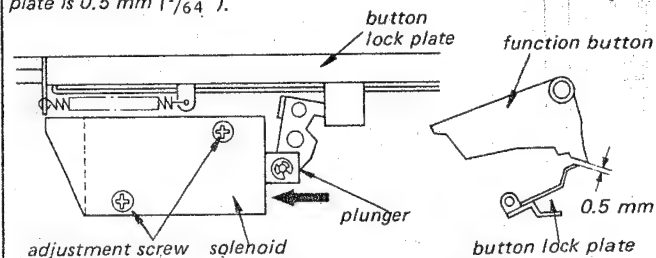
— STOP mode —



Solenoid Adjustment

— STOP mode —

With plunger pushed in arrow direction, and individual function button pushed, loosen adjusting screws and position solenoid so that clearance between button and button lock plate is 0.5 mm (1/64 inch).



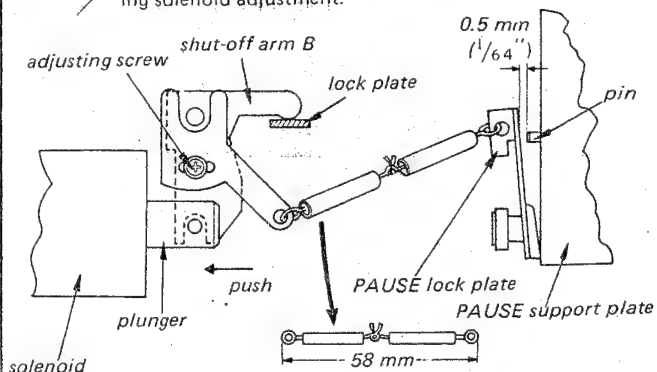
PAUSE Release Adjustment

— STOP mode —

Push plunger in arrow direction until shut-off arm B contacts lock plate. At the same time, PAUSE lock plate should be 0.5 mm (1/64 inch) from pin.

If necessary, adjust with adjusting screw.

Note: This adjustment should be made following solenoid adjustment.



CHECKS AFTER MECHANICAL ADJUSTMENTS

1. After mechanical adjustments, perform the following operation checks with a cassette loaded.

Mode	Depress	Remarks
playback mode	fast forward button rewind button PAUSE button stop button	possible
	RECORD button EJECT button	impossible
fast forward mode	stop button rewind button PAUSE button	possible
	forward button EJECT button RECORD button	impossible
rewind mode	stop button fast forward button PAUSE button	possible
	forward button EJECT button RECORD button	impossible
record mode	forward button STOP button PAUSE button	possible
	fast forward button rewind button EJECT button	impossible
record forward mode	STOP button PAUSE button	possible
	fast forward button rewind button EJECT button	impossible

2. Function Time of Auto Shut-off Mechanism.

This mechanism should stop tape motion within 1 ~ 4 seconds at tape end in playback, RECORD, fast forward and rewind modes.

3. Clean the following parts with an alcohol moistened swab.

belts, idlers, tires of reel spindles, pinch roller, capstan

3-3. ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

Precaution:

1. Clean the following parts with an alcohol moistened swab:

record/playback head	pinch roller
erase head	rubber belts
capstan	idlers
2. Demagnetize record/playback head with a head demagnetizer.
3. Do not use magnetized screwdriver for adjustments.
4. After adjustments, apply locking paint to the adjusted parts.
5. Adjustments should be performed in the order given in this service manual.
6. Adjustments and measurements should be performed for both L-CH and R-CH with rated power supply voltage unless otherwise specified.
7. Record and playback level adjustments should be carefully made. The levels must be as specified for correct DOLBY circuit operation.

Test Equipment/Tools Required:

audio oscillator (af osc)
VTVM
1-kHz bandpass filter
attenuator ($600\ \Omega$)
non-magnetic screwdriver
wow meter
distortion meter
blank tape (completely erased with
bulk eraser)
resistors $600\ \Omega$ ($\frac{1}{4}\ W$), $300\ \Omega$ ($\frac{1}{4}\ W$)
 $10\ k\Omega$ ($\frac{1}{4}\ W$), $100\ k\Omega$ ($\frac{1}{4}\ W$)

SONY test tapes

P-4-L81 (333 Hz, 0 dB)
P-4-A82 (10 kHz, -10 dB)
WS-48 (3 kHz, 0 dB)

Normal Input Level

	MIC	LINE IN
impedance	300 Ω	10 k Ω
input level	-60 dB (0.78 mV)	-10 dB (0.25 V)

Normal Output Level

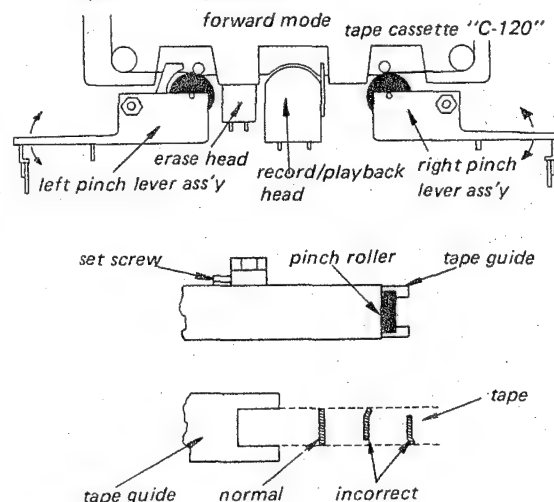
	LINE OUT
load impedance	100 k Ω
output level	0 dB (0.78 V)

Bias voltage across heads is as follows:

(VTVM reading)

erase head more than 37 dB (55 V)
record/playback head 26 ~ 28.5 dB (15 ~ 20 V)

1. Tape Path Adjustment



This adjustment is required when replacing pinch lever assembly.

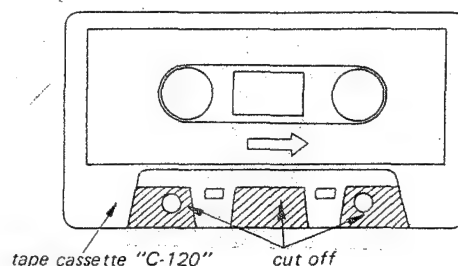
Procedure:

1. Place the unit in forward mode with the alignment tape cassette (shown below) inserted.
2. Repeat forward and PAUSE modes several times by depressing and releasing PAUSE button, watching tape passing through the tape guide.
3. If necessary, adjust tape guide height by set screw.

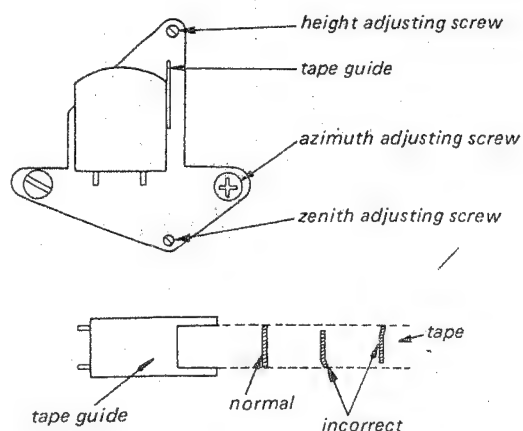
Note: Do not remove two pinch lever assemblies and record playback head at a time.

How to make alignment tape cassette.

Cut both sides of the cassette as shown below.



2. Head Height Adjustment



This adjustment should be performed when replacing tape path parts and before azimuth adjustment.

Procedure:

1. Push forward button slowly, with the alignment tape cassette (see page 19) inserted.
2. If the tape is curled on the tape guide, adjust by height adjusting screw.

Note: Zenith adjusting screw should be turned in the same direction and by the same degrees as the height adjusting screw.

3. Head Azimuth Adjustment

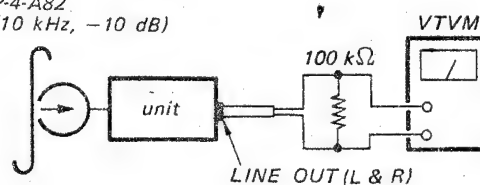
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

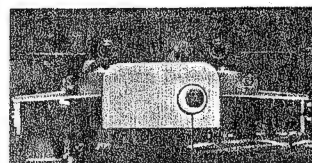
Procedure:

1. Mode: playback

P-4-A82
 (10 kHz, -10 dB)



Adjust azimuth adjusting screw for maximum VTVM readings for both L and R channels. If the readings don't coincide, set the screw midway between the two screw positions.



azimuth adjusting screw

4. Playback Level Adjustment

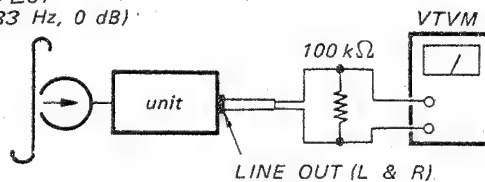
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

Procedure:

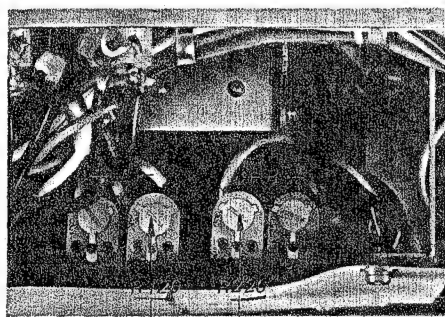
1. Mode: playback

P-4-L81
 (333 Hz, 0 dB)



- 2.

Adjust	VTVM reading	Remarks
R120 (L) R220 (R)	0 dB (0.78 V)	1. Allowance: within ± 0.5 dB 2. Level difference between L-CH and R-CH should be within 1 dB.



10 kΩ (B), adjustable

5. Playback Equalizer Adjustment

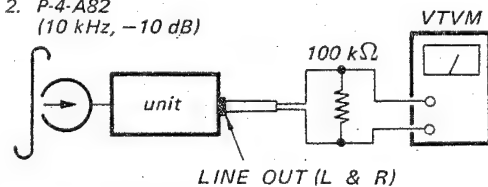
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

Procedure:

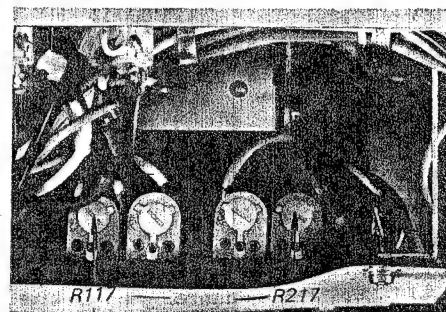
1. Mode: playback

1. P-4-L81
(333 Hz, 0 dB)
2. P-4-A82
(10 kHz, -10 dB)



Adjust R117 (L) and R217 (R) so that VTVM readings of P-4-A82 are lower by 11.5 dB than the P-4-L81 readings.

2. Perform this adjustment and playback level adjustment alternately until the satisfactory result is obtained for both adjustments.



5 kΩ (B), adjustable

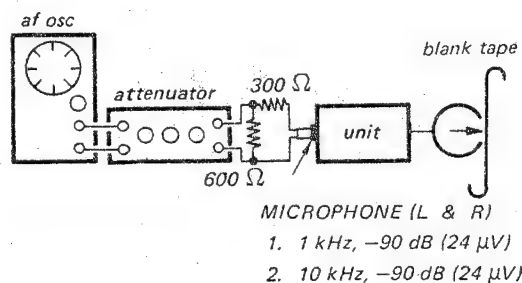
6. Recording Bias Adjustment

Control/Switch Setting:

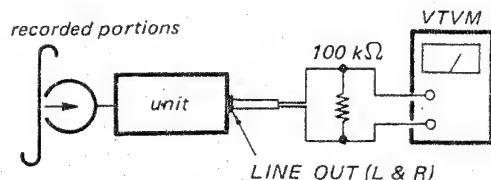
LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

Procedure:

1. Mode: record

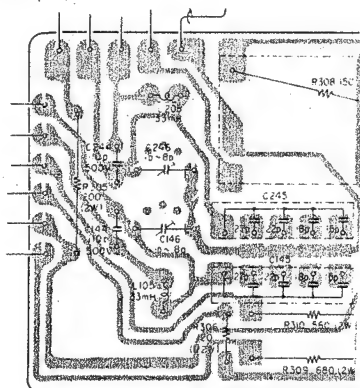


2. Mode: playback



Repeat steps 1 and 2 changing C145 (L) and C245 (R) connections so that playback output levels of 1 kHz and 10 kHz signals are the same. (Allowance: 0 ~ -1 dB) When 10 kHz output level exceeds 1 kHz output level, increase capacitance. When 1 kHz output level exceeds 10 kHz output level, decrease capacitance.

3. If necessary, adjust by trimmer capacitors C146 (L) and C246 (R).



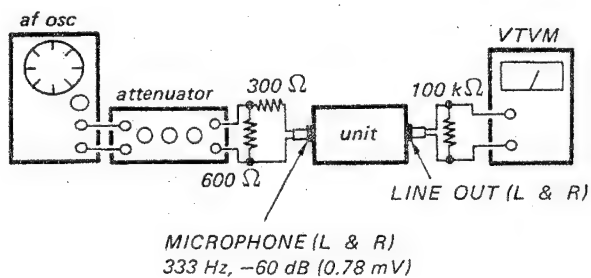
8. LEVEL Meter Calibration

Control/Switch Setting:

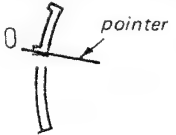
LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

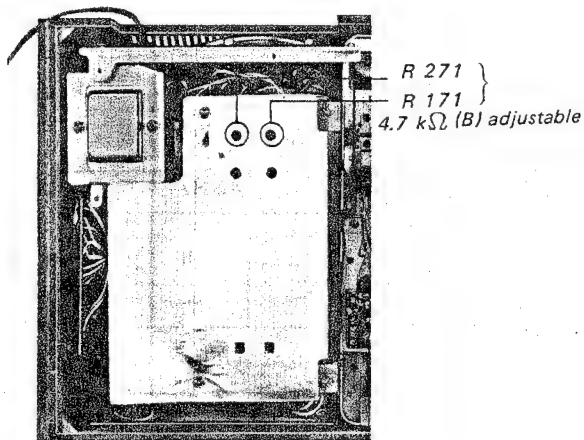
Procedure:

1. Mode: record



- 2.

Adjust	LEVEL meter reading
R171 (L) R271 (R)	



9. Playback Signal-to-Noise Ratio Measurement

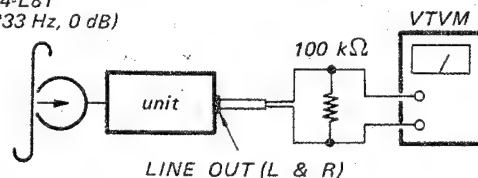
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

Procedure:

1. Mode: playback

P-4-L81
 (333 Hz, 0 dB)



2. Memorize the VTVM reading.
3. Push PAUSE button and observe VTVM.

Specification:

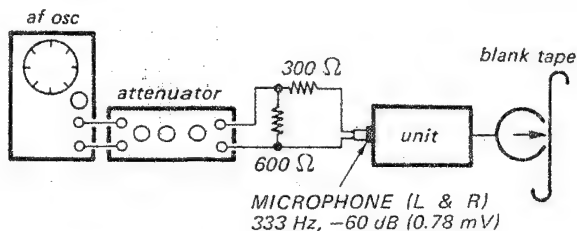
Level Difference between Step 2 and Step 3:
 greater than 49 dB.

10. Overall Signal-to-noise Ratio Measurement

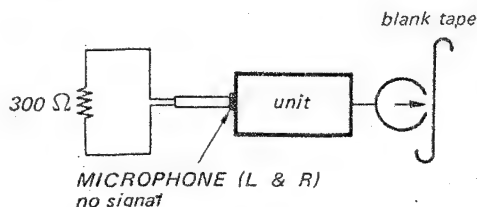
Contrl/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

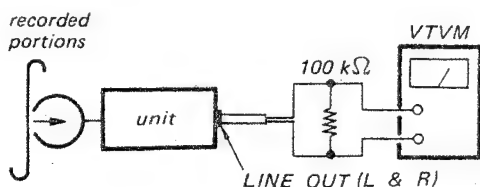
1. Mode: record



2. Mode: record



3. Mode: playback



Playback	Level Difference
333 Hz	greater than 46 dB
no signal	

- Measure S/N ratio for 1 kHz and 10 kHz signals according to Steps 1 to 3.
- With DOLBY switch set to ON position, perform Step 4.
- Ensure that DOLBY system improves S/N ratio.

Specification:

4 dB or more at 1 kHz
 8 dB or more at 10 kHz

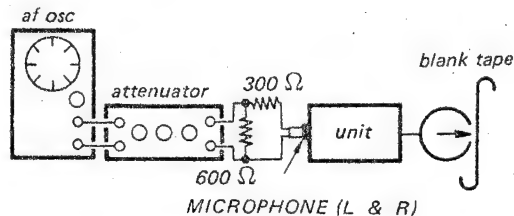
11. Overall Frequency Response Measurement

Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

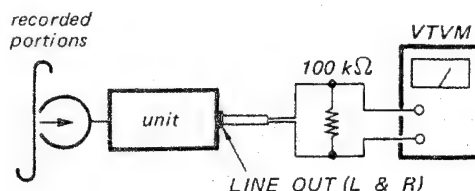
Procedure:

1. Mode: record



- 40 Hz, -80 dB (78 μ V)
- 1 kHz, -80 dB (78 μ V)
- 7 kHz, -80 dB (78 μ V)
- 10 kHz, -80 dB (78 μ V)
- 12.5 kHz, -80 dB (78 μ V)

2. Mode: playback



3. Output Level Difference from 1 kHz output level:

DOLBY switch: ON

Tape	40 Hz	10 kHz
C-120	+4 -2 dB	±4 dB
Chromium Dioxide CRO-60		

DOLBY switch: OFF

Tape	40 Hz	7 kHz	12.5 kHz
C-120	+0 -6 dB	+2 -0 dB	+2 -10 dB
Chromium Dioxide CRO-60	+0 -6 dB	±3 dB	±4 dB

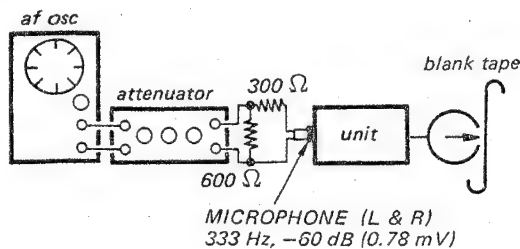
12. Overall Distortion Measurement

Control/Switch Setting:

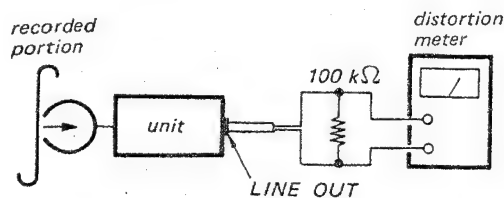
LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

Procedure:

1. Mode: record



2. Mode: playback



Specification: less than 2 %

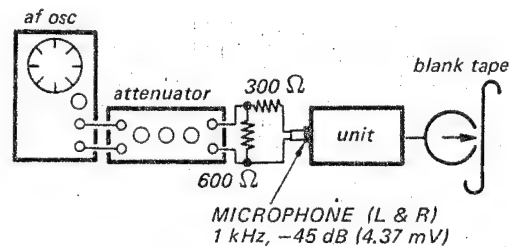
13. Erase Ratio Measurement

Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

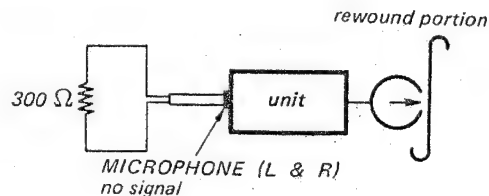
Procedure:

1. Mode: record

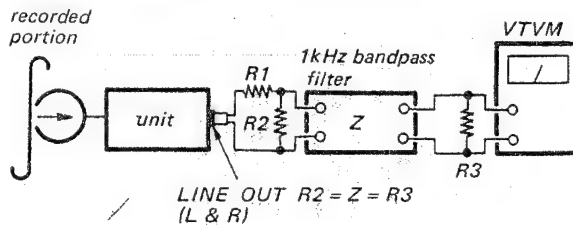


2. Rewind half of the recorded portion.

3. Mode: record



4. Mode: playback



Recorded Signal	Level Difference
1 kHz	greater than 60 dB
no signal	

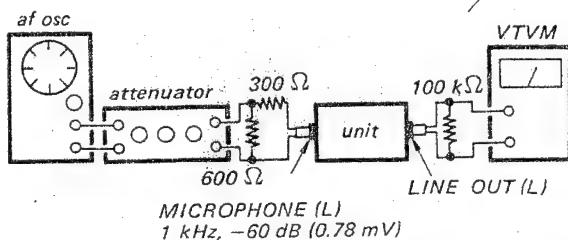
14. Channel Balance Check

Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

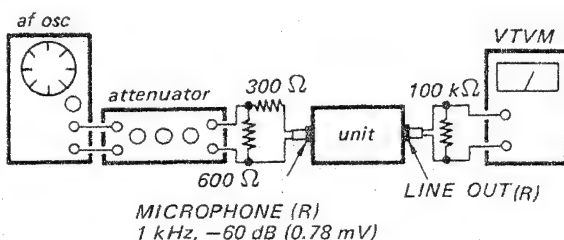
Procedure:

1. Mode: record



Adjust L-CH RECORD VOLUME control for 0 dB (0.78 V) LINE OUT level.

2. Mode: record



Adjust R-CH RECORD VOLUME control at the same position as L-CH, and observe VTVM reading.

Specification: -3 ~ 3 dB (0.55 ~ 1.1 V)

15. Cross-talk Measurement (between L and R channels)

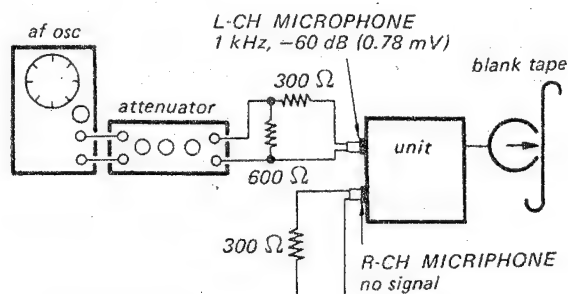
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME

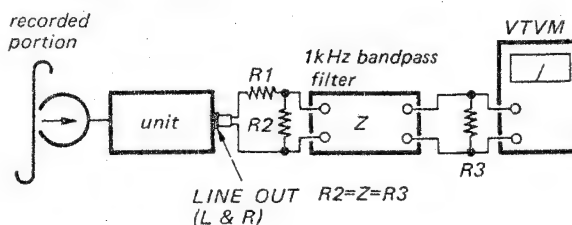
control: For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

Procedure:

1. Mode: record



2. Mode Playback



Play back	Level Difference
L-CH (1 kHz)	greater than 30 dB
R-CH (no signal)	

16. 19 kHz Filter Check

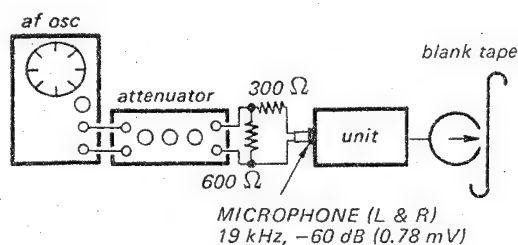
Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF
 RECORD VOLUME control:

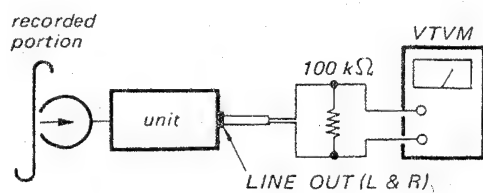
For 0 dB (0.78 V) LINE OUT level when supplying a 333 Hz, -60 dB (0.78 mV) signal to MICROPHONE jack.

Procedure:

1. Mode: record



2. Mode: playback



Specification:

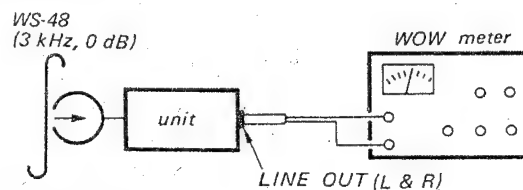
VTVM reading: less than -28 dB
 (30.8 mV)

17. Wow and Flutter Measurement

Control/Switch Setting:

LIMITER switch: OFF
 TAPE SELECT switch: NORMAL
 DOLBY switch: OFF

Procedure:



Specification: 0.2 % (RMS)

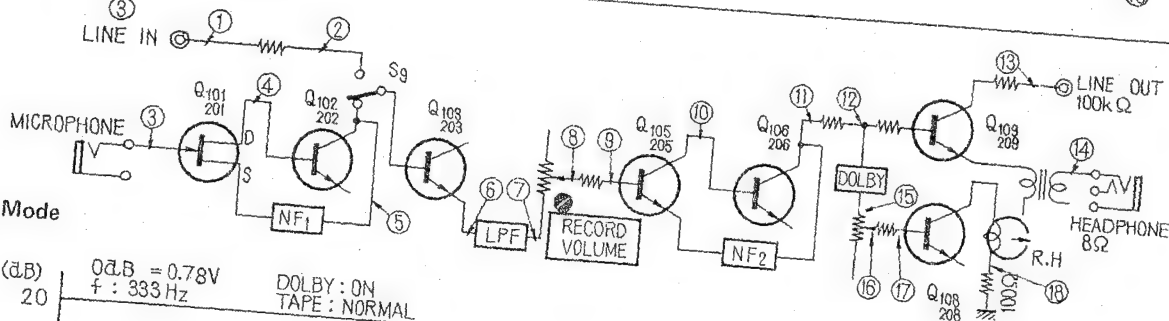
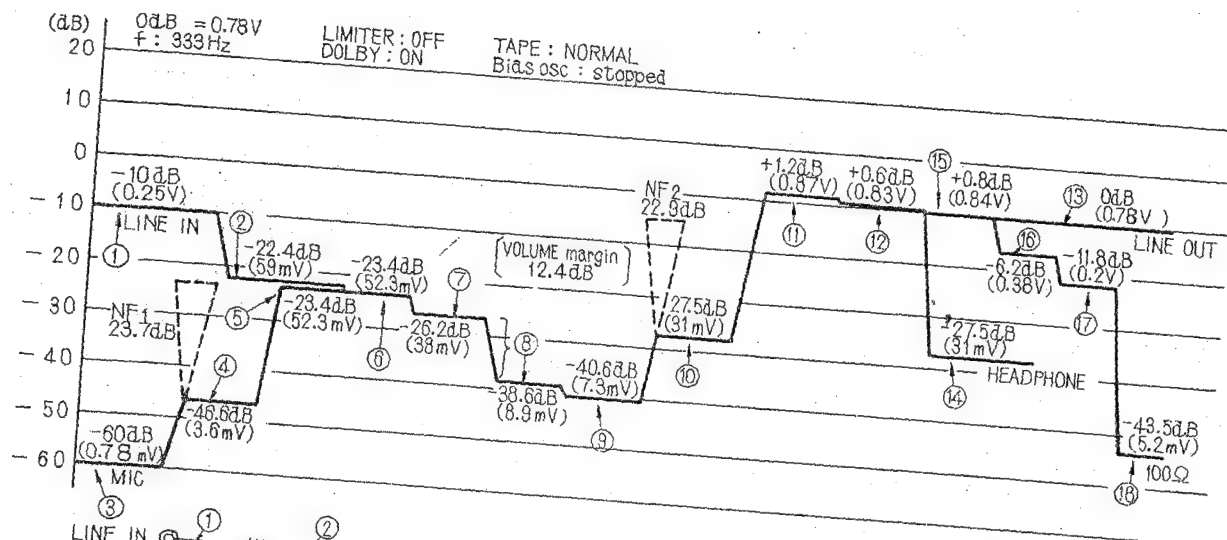
Note: Measure wow and flutter at beginning, midway and end portion of tape (WS-48).

-161SD

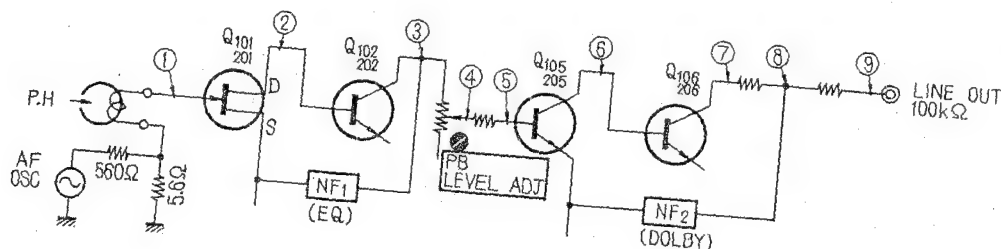
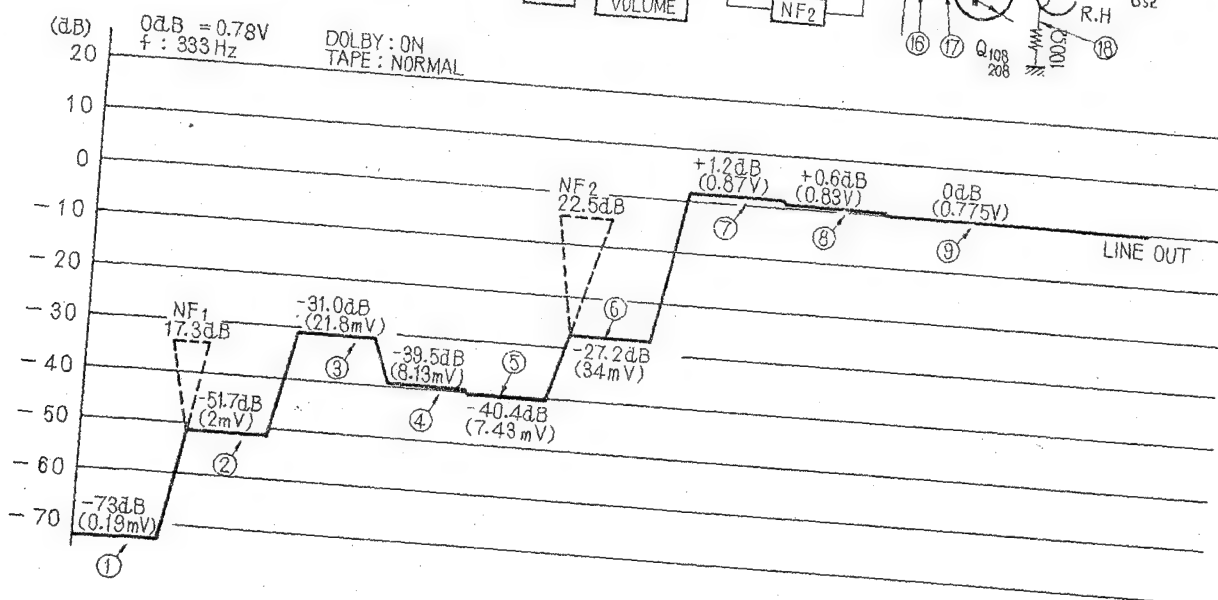
SECTION 4 DIAGRAMS

4.1. LEVEL DIAGRAM

Playback Mode

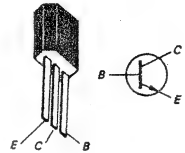


Record Mode

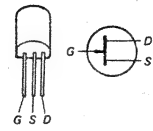


TRANSISTORS AND DIODES

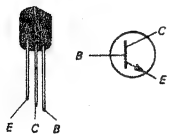
- | | | |
|-----------|---|---------|
| Q102, 202 | } | 2SC631A |
| Q103, 203 | | |
| Q105, 205 | } | 2SC632A |
| Q503, 603 | | |
| Q104, 204 | } | 2SC633A |
| Q107, 207 | | |
| Q108, 208 | | |
| Q301, 302 | | |
| Q401, 402 | | |
| Q403, 404 | | |
| Q405 | } | 2SC634A |
| Q106, 206 | | |
| Q109, 209 | | |
| Q501, 502 | | |
| Q504, 505 | | |
| Q506, 507 | | |
| Q601, 602 | | |
| Q604, 605 | | |
| Q606, 607 | | |



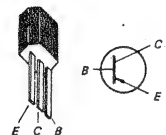
- Q101 } 2SK43
Q201 }



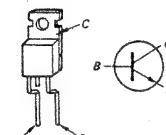
- Q303: 2SC1384**



- Q304: 2SA678**

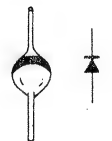


- Q406: 2SD343**

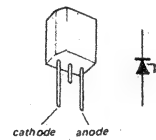


- D102, 202 } 1T-40
D402, 403 }
D103, 203 }
D405, 501 } 1T-22
D502, 601 }
D602 }
D503, 603 } 1S1555
D504, 604 }

- D101 } VO-6C
D201 }

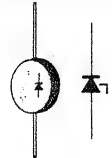


- D301 } MZ-08
D404 }

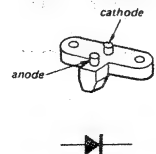


- D303, 304 }
D305, 306 } 10D-2
D406, 407 }
D408, 409 }
D410 }

- D302: ZB1-19

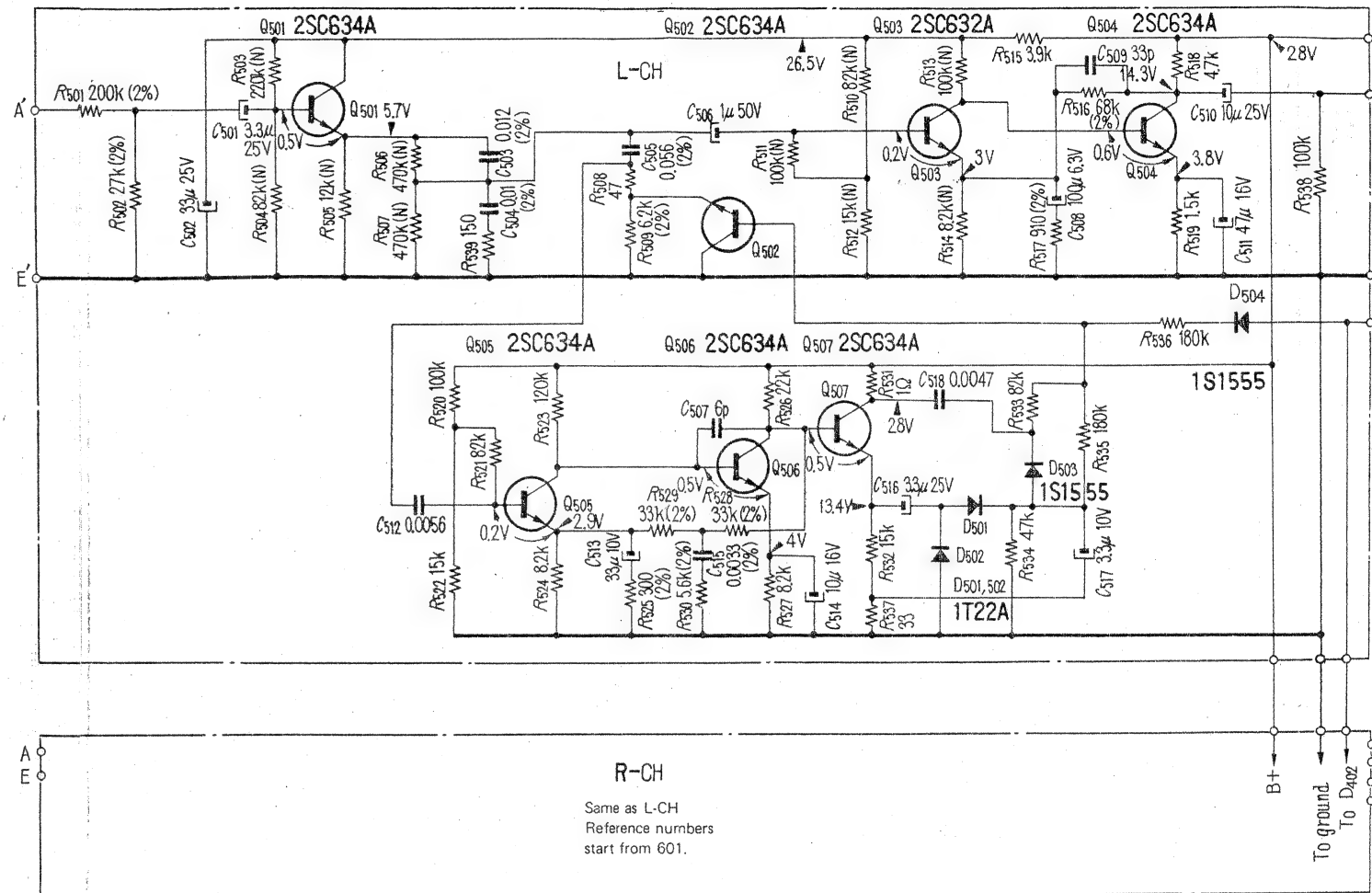


- D401: MD130E




4-2. SCHEMATIC DIAGRAMS


DOLBY Circuit



Note:

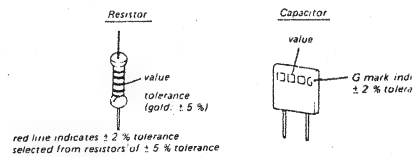
1. All resistors and capacitors are rated in Ω and μF unless otherwise indicated.
2.  indicates ground to chassis.
3. The letter (N) which is suffixed to rating values shows a low-noise resistor.
4. Voltage values shown are measured with a voltmeter (20 $\text{k}\Omega/\text{V}$) in playback mode.

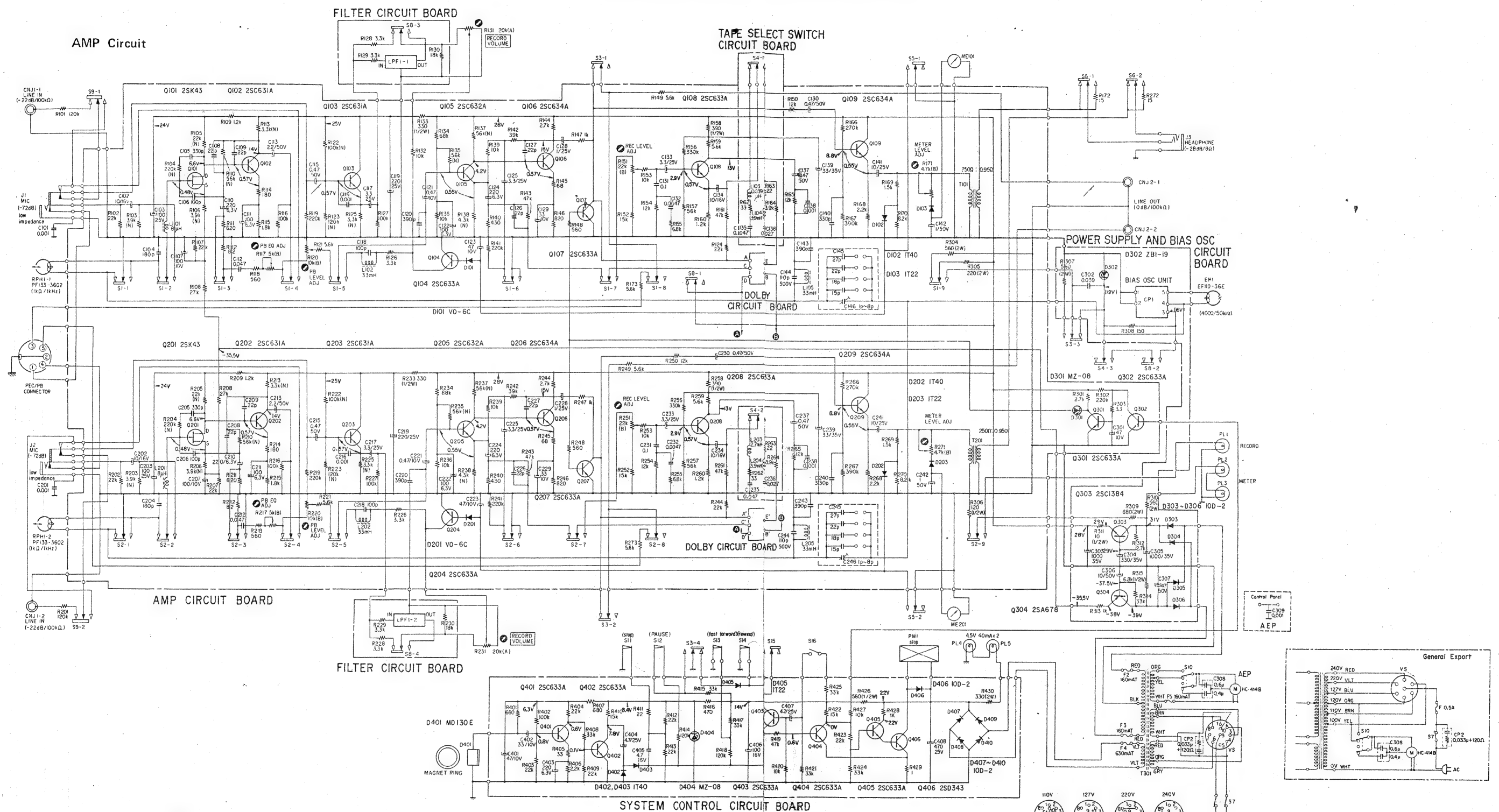
Variations may be noted because of normal production tolerances.

5. : adjustable
6. Components for R-CH are the same value as for L-CH.

When replacing resistors and capacitors needing $\pm 2\%$ tolerance, use only those with red line or G mark, as DOLBY system requires precise circuit operation.

2% Tolerance Identification



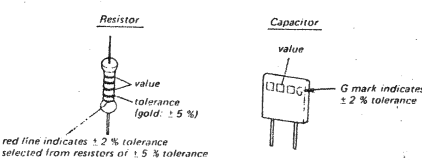


Note:

- All resistors and capacitors are rated in Ω and μF unless otherwise indicated.
- --- indicates ground to chassis.
- The letter (N) which is suffixed to rating values shows a low-noise resistor.
- Voltage values shown are measured with a voltmeter (20 k Ω /V) in playback mode. Variations may be noted because of normal production tolerances.
- Voltage values for L-CH is the same as for R-CH.

- When replacing resistors and capacitors specified with 2 % tolerance, use the specified ones, since DOLBY system requires precise circuit operation

2 % Tolerance Identification

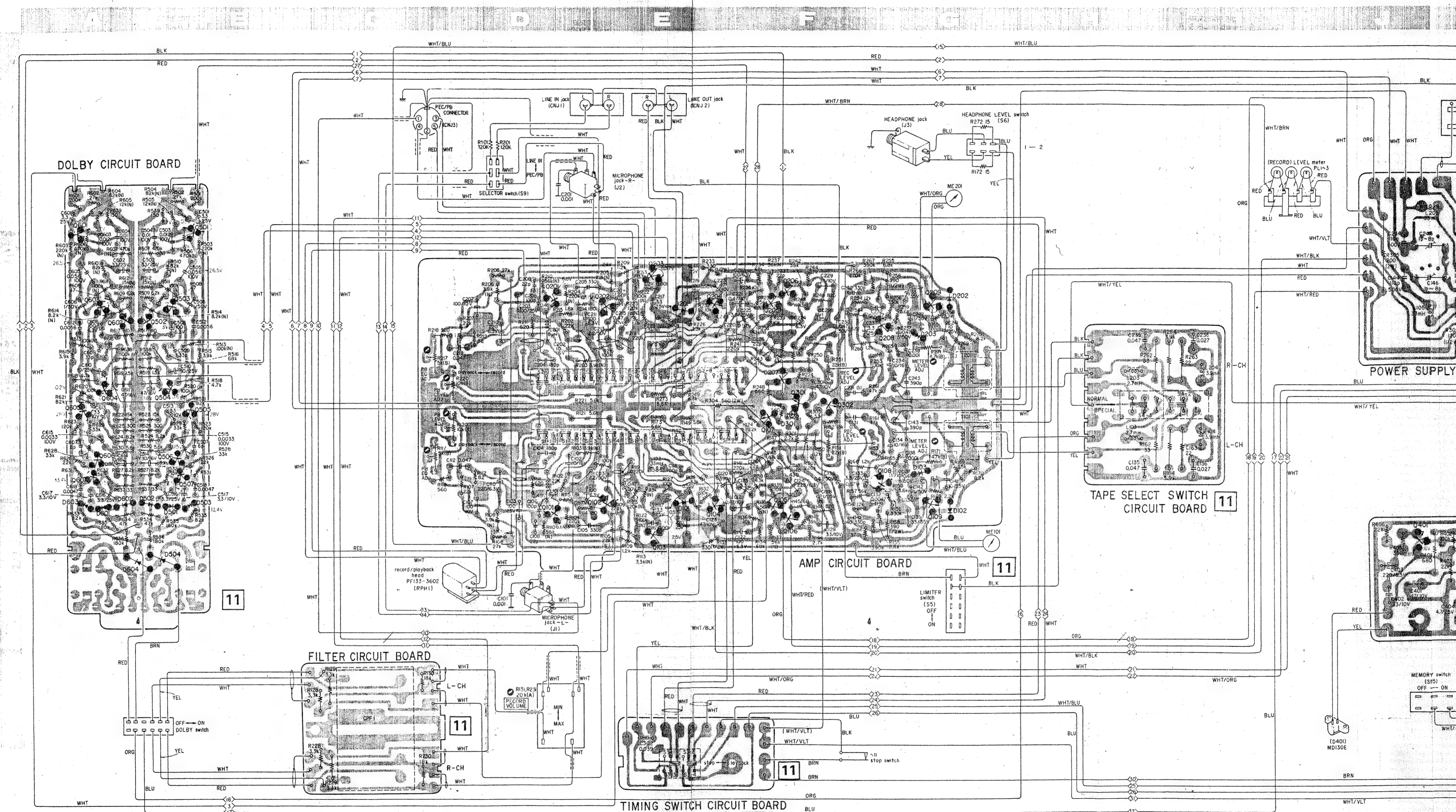


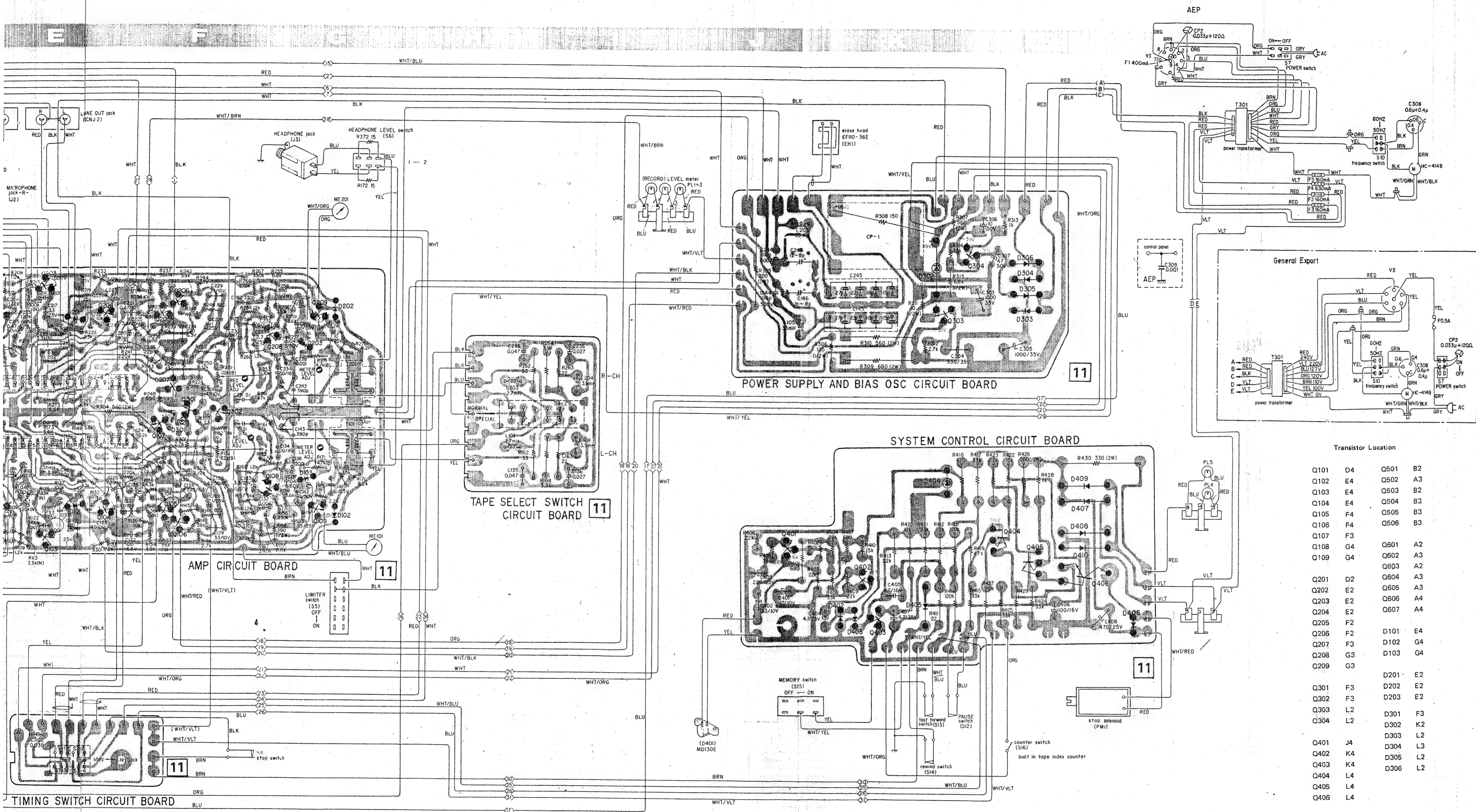
7. Switch mode.

Ref. No.	Switch	Mode
S1-1 ~ 9	record/playback	playback
S2-1 ~ 9	record/playback	playback
S3-1 ~ 4	timing	playback
S4-1, 2	TAPE SELECT	NORMAL
S5-1, 2	LIMITER	ON
S6-1, 2	HEADPHONE LEVEL	1
S7	POWER	ON
S8-1 ~ 4	DOLBY	OFF
S9		
S10		

Ref. No.	Switch	Mode
S11	STOP	OFF
S12	PAUSE	OFF
S13	fast forward	OFF
S14	rewind	OFF
S15	MEMORY	OFF
S16	COUNTER	OFF

3-3. MOUNTING DIAGRAMS



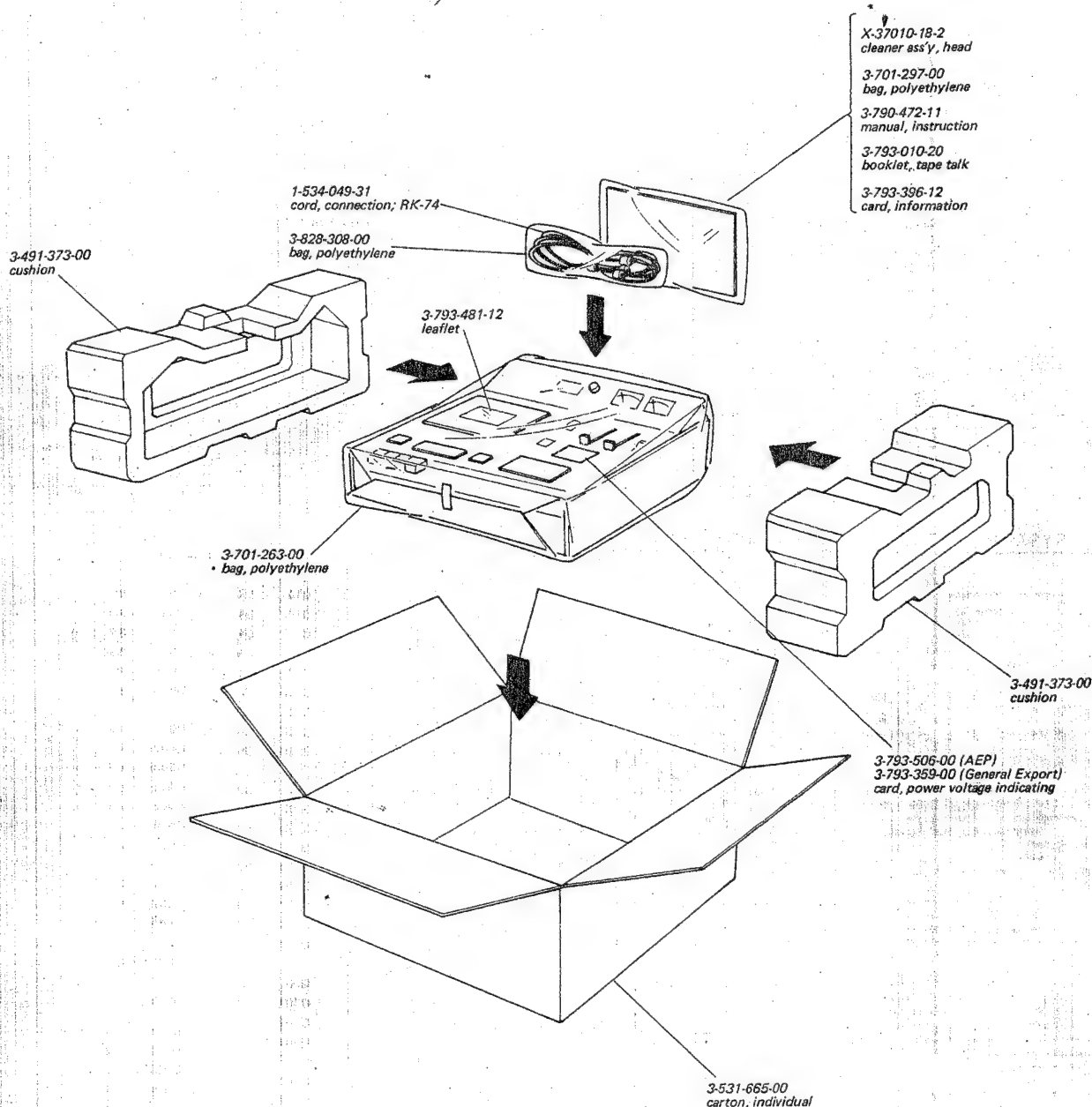


SECTION 5

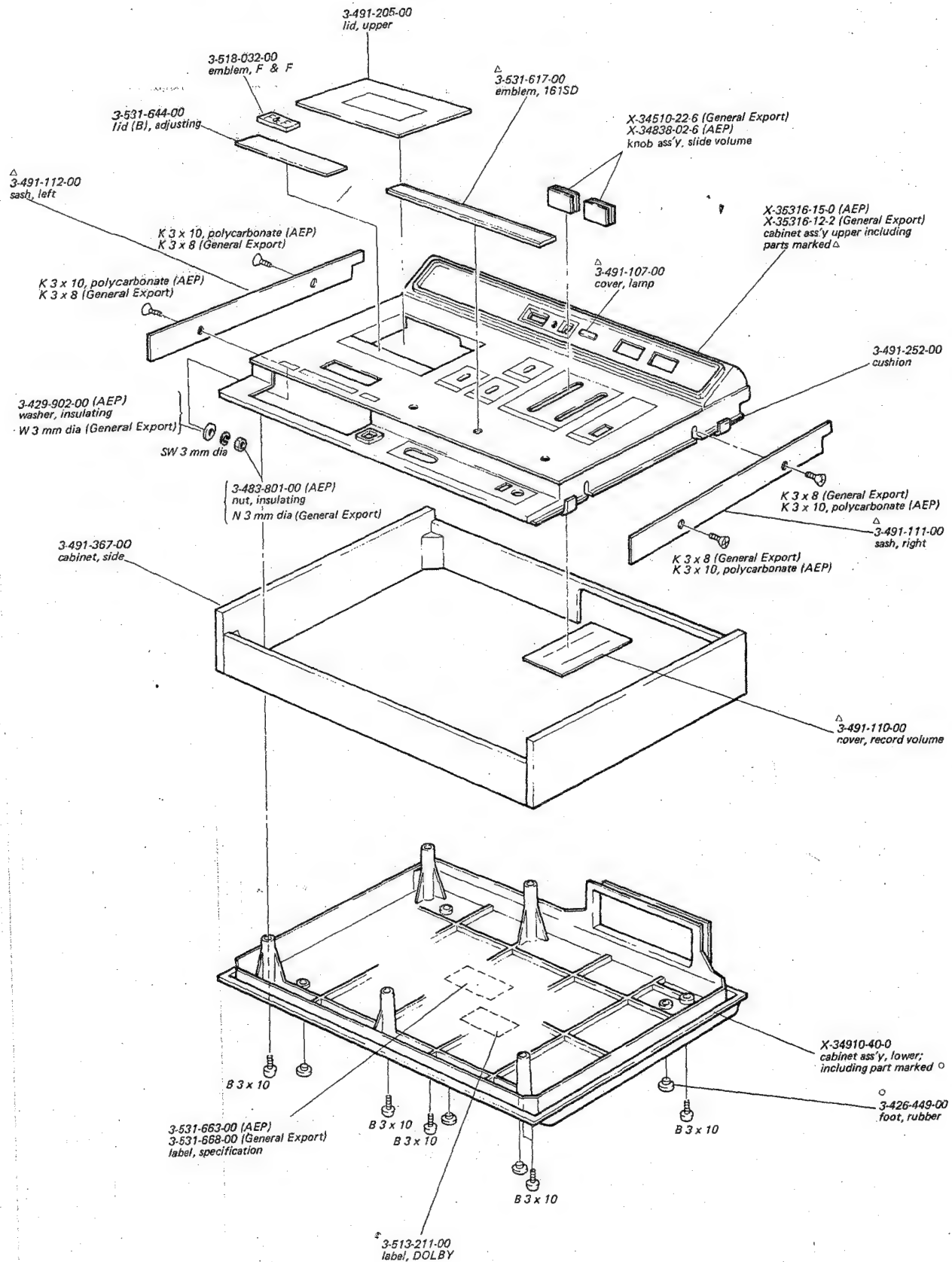
EXPLODED VIEWS

Parts without part numbers are not available.
 All screws are Phillips type (cross recess type) unless otherwise indicated.
 (—) : slotted head.

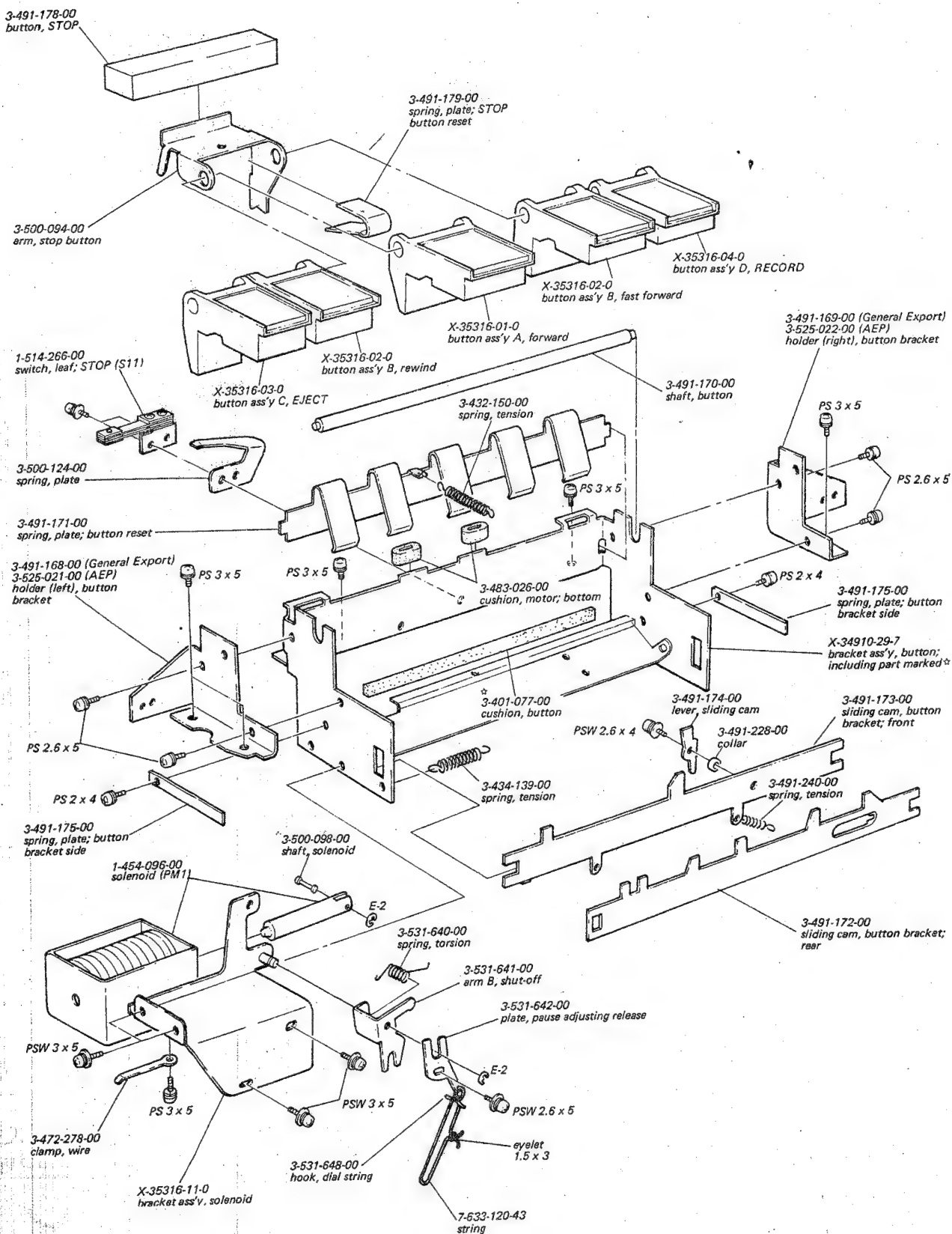
5-1. PACKING



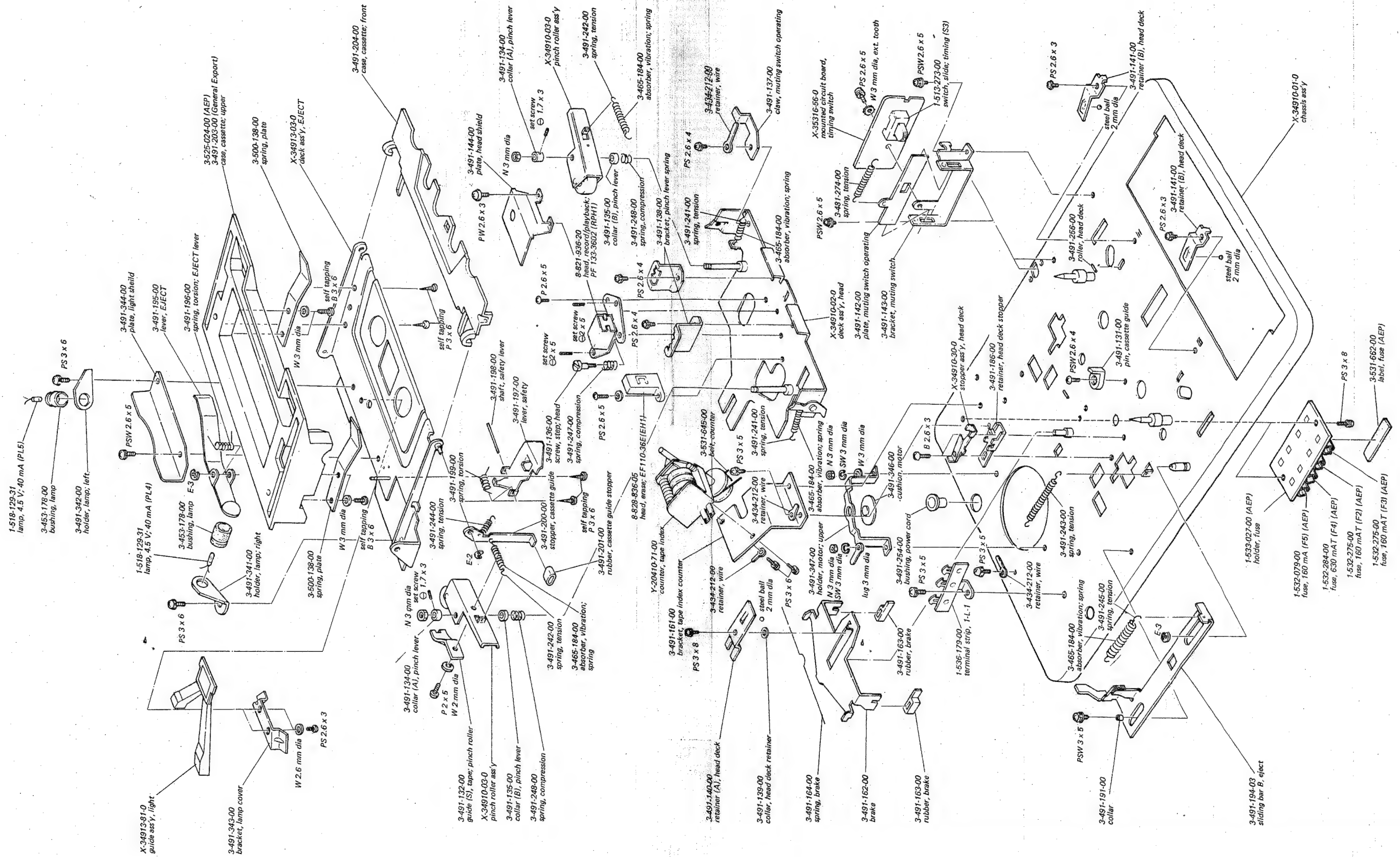
5-2. CABINET - Top View -



5-3. BUTTONS

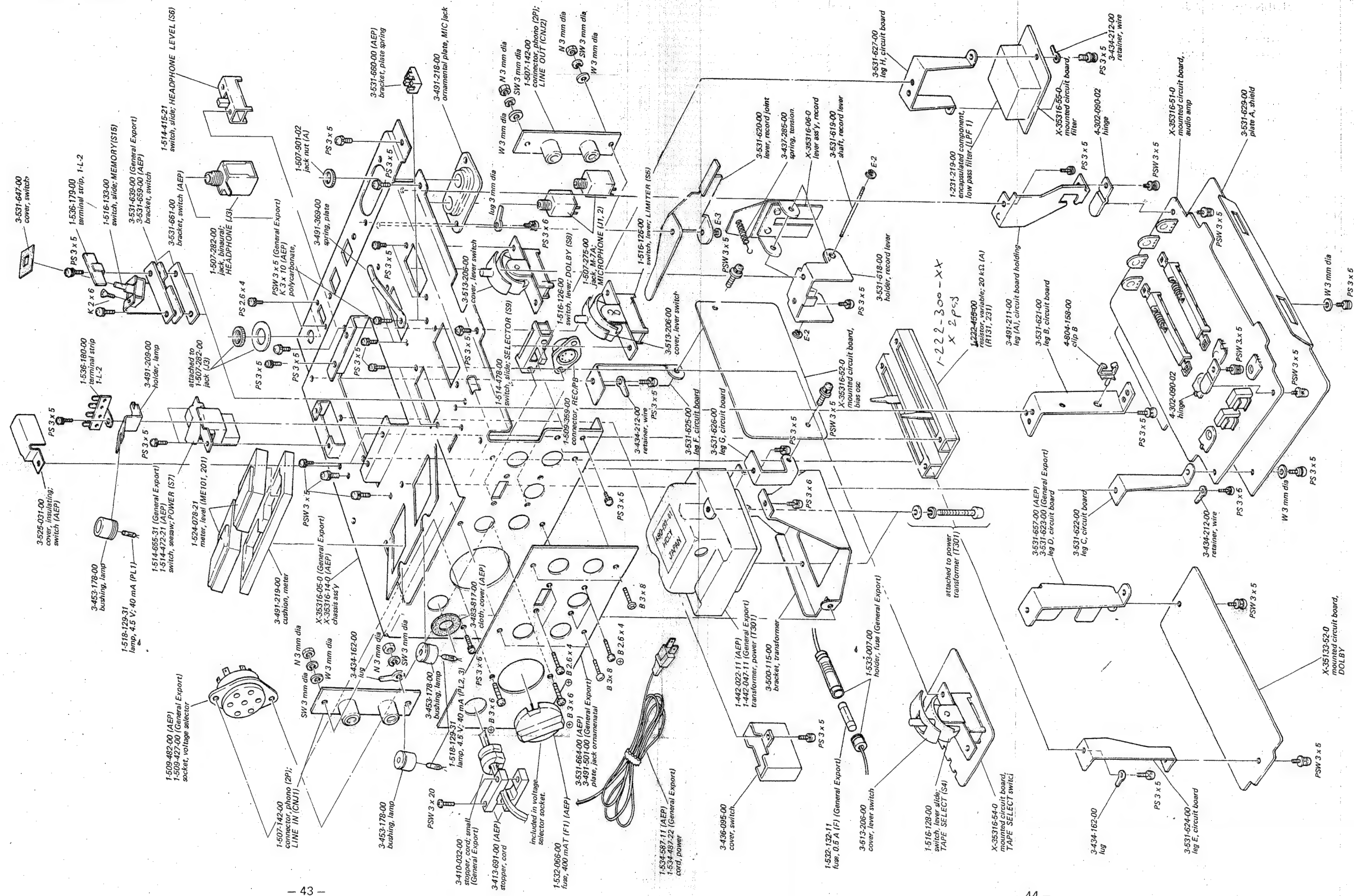


5-4. CHASSIS — Top View —



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SECTION 6

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
MOUNTED CIRCUIT BOARD		

X-35316-51-0	audio amp
X-35133-52-0	DOLBY
X-35316-52-0	bias osc
X-35316-53-0	system control
X-35316-54-0	TAPE SELECT switch
X-35316-55-0	filter
X-35316-56-0	timing switch

SEMICONDUCTORS

Q101, 201	FET	2SK 43
Q102, 202	transistor	2SC631A
Q103, 203	transistor	2SC631A
Q104, 204	transistor	2SC633A
Q105, 205	transistor	2SC632A
Q106, 206	transistor	2SC634A
Q107, 207	transistor	2SC633A
Q108, 208	transistor	2SC633A
Q109, 209	transistor	2SC634A
Q301, 302	transistor	2SC633A
Q303	transistor	2SC1384
Q304	transistor	2SA678
Q401, 402	transistor	2SC633A
Q403, 404	transistor	2SC633A
Q405	transistor	2SC633A
Q406	transistor	2SD343
Q501, 601	transistor	2SC634A
Q502, 602	transistor	2SC634A
Q503, 603	transistor	2SC632A
Q504, 604	transistor	2SC634A
Q505, 605	transistor	2SC634A
Q506, 606	transistor	2SC634A
Q507, 607	transistor	2SC634A

D101, 201	diode	VO-6C
D102, 202	diode	1T-40
D103, 203	diode	1T-22
D301	diode	MZ-08
D302	diode	ZB1-19
D303, 304	diode	10D-2
D305, 306	diode	10D-2
D401	diode	MD130E
D402, 403	diode	1T-40
D404	diode	MZ-08
D405	diode	1T-22
D406, 407	diode	10D-2
D408, 409	diode	10D-2
D410	diode	10D-2
D501, 601	diode	1T-22
D502, 602	diode	1T-22
D503, 603	diode	1S1555
D504, 604	diode	1S1555

Ref. No.	Part No.	Description
COILS AND TRANSFORMERS		

L101, 201	1-407-519-00	coil, inductor	8 μ H
L102, 202	1-407-561-00	coil, micro inductor	33 mH
L103, 203	1-407-497-00	coil, micro inductor	2.7 mH
L104, 204	1-407-499-00	coil, micro inductor	3.9 mH
L105, 205	1-407-561-00	coil, micro inductor	33 mH
T101, 201	1-427-299-00	transformer, output	
T301	1-442-022-11	transformer, power (AEP)	
	1-442-047-11	transformer, power (General Export)	

CAPACITORSAll capacitors are in μ F unless otherwise indicated.(p = μ F, elect = electrolytic)

C101, 201	1-101-455-11	0.001	50 V	ceramic
C102, 202	1-121-651-11	10	16 V	elect
C103, 203	1-121-416-11	100	25 V	elect
C104, 204	1-107-091-11	180 p	50 V	silvered mica
C105, 205	1-107-143-11	330 p	50 V	silvered mica
C106, 206	1-107-085-11	100 p	50 V	silvered mica
C107, 207	1-121-491-11	100	10 V	elect
C108, 208	1-107-115-11	22 p	50 V	silvered mica
C109, 209	1-107-115-11	22 p	50 V	silvered mica
C110, 210	1-121-419-11	220	6.3 V	elect
C111, 211	1-121-413-11	100	6.3 V	elect
C112, 212	1-105-521-12	0.047	50 V	mylar
C113, 213	1-121-450-11	2.2	50 V	elect
C114	-----			
C115, 215	1-121-726-11	0.47	50 V	elect
C116, 216	1-105-661-12	0.001	50 V	mylar
C117, 217	1-121-392-11	3.3	25 V	elect
C118, 218	1-105-085-11	100 p	50 V	silvered mica
C119, 219	1-121-422-11	220	25 V	elect
C120, 220	1-102-113-11	390 p	50 V	ceramic
C121, 221	1-127-048-11	0.47	10 V	solid aluminum elect
C122, 222	1-121-413-11	100	6.3 V	elect
C123, 223	1-121-352-11	47	10 V	elect
C124, 224	1-121-419-11	220	6.3 V	elect
C125, 225	1-121-392-11	3.3	25 V	elect
C126, 226	1-107-115-11	22 p	50 V	silvered mica
C127, 227	1-107-115-11	22 p	50 V	silvered mica
C128, 228	1-121-390-11	1	25 V	elect
C129, 229	1-121-402-11	33	10 V	elect
C130, 230	1-121-726-11	0.47	50 V	elect
C131, 231	1-105-685-12	0.1	50 V	mylar
C132, 232	1-105-669-12	0.0047	50 V	mylar
C133, 233	1-121-392-11	3.3	25 V	elect
C134, 234	1-121-651-11	10	16 V	elect
C135, 235	1-108-509-11	0.047	50 V	mylar
C136, 236	1-108-506-11	0.027	50 V	mylar
C137, 237	1-121-726-11	0.47	50 V	elect
C138, 238	1-105-661-12	0.001	50 V	mylar

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
C139, 239	1-121-652-11	33	3.5 V elect	R104, 204	1-242-729-09	220 k (N)
C140, 240	1-102-112-11	330 p	50 V ceramic	R105, 205	1-242-705-09	22 k (N)
C141, 241	1-121-398-11	10	25 V elect	R106, 206	1-242-687-09	3.9 k (N)
C142, 242	1-121-391-11	1	50 V elect	R107, 207	1-242-705-11	22 k
C143, 243	1-107-242-11	390 p	50 V silvered mica	R108, 208	1-242-707-11	27 k
C144, 244	1-107-170-11	110 p	500 V silvered mica	R109, 209	1-242-675-11	1.2 k
C145, 245	1-107-253-11	15+18+22+27p	500V silvered mica	R110, 210	1-242-715-09	56 k (N)
C146, 246	1-141-140-00	1 ~ 8 p	trimmer	R111, 211	1-242-668-11	620
C301	1-121-352-11	47	10 V elect	R112, 212	1-242-647-11	82
C302	1-105-680-12	0.039	50 V mylar	R113, 213	1-242-685-09	3.3 k (N)
C303	1-121-388-11	1000	35 V elect	R114, 214	1-242-655-11	180
C304	1-121-655-11	330	35 V elect	R115, 215	1-242-679-11	1.8 k
C305	1-121-388-11	1000	35 V elect	R116, 216	1-242-721-11	100 k
C306	1-121-738-11	10	35 V elect	R117, 217	1-221-311-00	5 k (B), adjustable
C307	1-121-411-11	47	50 V elect	R118, 218	1-242-667-11	560
C308	1-117-093-11	0.6+0.4	250 V MP	R119, 219	1-242-729-11	220 k
C309	1-102-222-11	0.001	250 V ceramic (AEP)	R120, 220	1-221-383-00	10 k (B), adjustable
C401	1-121-352-11	47	10 V elect	R121, 221	1-244-691-11	5.6 k
C402	1-121-402-11	33	10 V elect	R122, 222	1-242-721-09	100 k (N)
C403	1-121-419-11	220	6.3 V elect	R123, 223	1-242-723-09	120 k (N)
C404	1-121-395-11	4.7	25 V elect	R124, 224	1-242-705-11	22 k
C405	1-121-257-11	4.7	16 V elect	R125, 225	1-242-685-09	3.3 k (N)
C406	1-121-415-11	100	16 V elect	R126, 226	1-242-685-11	3.3 k
C407	1-121-395-11	4.7	25 V elect	R127, 227	1-242-721-11	100 k
C408	1-121-733-11	470	25 V elect	R128, 228	1-242-685-11	3.3 k
C501, 601	1-121-392-11	3.3	25 V elect	R129, 229	1-242-685-11	3.3 k
C502, 602	1-121-404-11	33	25 V elect	R130, 230	1-242-703-11	18 k
C503, 603	1-129-896-21	0.012 ± 2 %	100 V polypropylene	R131, 231	1-222-455-00	20 k (A), variable
C504, 604	1-129-701-21	0.01 ± 2 %	100 V polypropylene	R132, 232	1-242-697-11	10 k
C505, 605	1-129-899-11	0.056 ± 2 %	100 V polypropylene	R133, 233	1-244-861-11	330 ½ W
C506, 606	1-121-391-11	1	50 V elect	R134, 234	1-242-717-11	68 k
C507, 607	1-107-103-11	6 p	50 V silvered mica	R135, 235	1-242-715-09	56 k (N)
C508, 608	1-121-413-11	100	6.3 V elect	R136, 236	1-242-697-11	10 k
C509, 609	1-107-119-11	33 p	50 V silvered mica	R137, 237	1-242-715-09	56 k (N)
C510, 610	1-121-398-11	10	25 V elect	R138, 238	1-242-688-09	4.3 k (N)
C511, 611	1-121-409-11	47	16 V elect	R139, 239	1-242-697-11	10 k
C512, 612	1-105-670-12	0.0056	50 V mylar	R140, 240	1-242-664-11	430
C513, 613	1-121-402-11	33	10 V elect	R141, 241	1-242-729-11	220 k
C514, 614	1-121-651-11	10	16 V elect	R142, 242	1-242-711-11	39 k
C515, 615	1-129-794-21	0.0033 ± 2 %	100 V polypropylene	R143, 243	1-242-713-11	47 k
C516, 616	1-121-392-11	3.3	25 V elect	R144, 244	1-242-683-11	2.7 k
C517, 617	1-127-025-11	3.3	10 V solid aluminum elect	R145, 245	1-242-645-11	68
C518, 618	1-105-669-12	0.0047	50 V mylar	R146, 246	1-242-671-11	820
				R147, 247	1-242-673-11	1 k
				R148, 248	1-242-667-11	560
				R149, 249	1-242-691-11	5.6 k
				R150, 250	1-242-699-11	12 k
				R151, 251	1-222-775-00	22 k (B), adjustable
				R152, 252	1-242-701-11	15 k
				R153, 253	1-242-697-11	10 k
				R154, 254	1-242-699-11	12 k
				R155, 255	1-242-693-11	6.8 k

RESISTORS

All resistors are ¼ W, carbon type and in Ω unless otherwise indicated. (k = 1,000) N : low noise

R101, 201	1-244-723-11	120 k
R102, 202	1-242-705-11	22 k
R103, 203	1-242-687-09	3.9 k (N)

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
R156, 256	1-242-733-11	330 k	R421	1-244-709-11	33 k
R157, 257	1-242-715-11	56 k	R422	1-244-701-11	15 k
R158, 258	1-244-863-11	390 $\frac{1}{2}$ W	R423	1-244-705-11	22 k
R159, 259	1-242-691-11	5.6 k	R424	1-244-709-11	33 k
R160, 260	1-242-675-11	1.2 k	R425	1-244-709-11	33 k
R161, 261	1-242-713-11	47 k	R426	1-244-867-11	560 $\frac{1}{2}$ W
R162, 262	1-244-637-11	33	R427	1-244-697-11	10 k
R163, 263	1-244-633-11	22	R428	1-244-673-11	1 k
R164, 264	1-244-687-11	3.9 k	R429	1-244-601-11	1
R165, 265	1-242-699-11	12 k	R430	1-206-652-11	330 2 W metal oxide
R166, 266	1-242-731-11	270 k	R501, 601	1-210-858-11	200 k $\pm 2\%$
R167, 267	1-242-735-11	390 k	R502, 602	1-210-854-11	27 k $\pm 2\%$
R168, 268	1-242-681-11	2.2 k	R503, 603	1-242-729-09	220 k (N)
R169, 269	1-242-677-11	1.5 k	R504, 604	1-242-719-09	82 k (N)
R170, 270	1-242-695-11	8.2 k	R505, 605	1-242-699-09	12 k (N)
R171, 271	1-222-773-00	4.7 k (B), adjustable	R506, 606	1-242-737-09	470 k (N)
R172, 272	1-242-629-11	15	R507, 607	1-242-737-09	470 k (N)
R173, 273	1-242-691-11	5.6 k	R508, 608	1-242-641-11	47
R301	1-242-683-11	2.7 k	R509, 609	1-210-853-11	6.2 k $\pm 2\%$
R302	1-242-729-11	220 k	R510, 610	1-242-719-09	82 k (N)
R303	1-242-613-11	3.3	R511, 611	1-242-721-09	100 k (N)
R304	1-206-658-11	560 2 W metal oxide	R512, 612	1-242-701-09	15 k (N)
R305	1-206-647-11	200 2 W metal oxide	R513, 613	1-242-721-09	100 k (N)
R306	1-202-551-11	120 $\frac{1}{2}$ W composition	R514, 614	1-242-695-09	8.2 k (N)
R307	1-206-658-11	560 2 W metal oxide	R515, 615	1-242-687-11	3.9 k
R308	1-242-653-11	150	R516, 616	1-210-856-11	68 k $\pm 2\%$
R309	1-206-660-11	680 2 W metal oxide	R517, 617	1-210-815-11	910 $\pm 2\%$
R310	1-206-658-11	560 2 W metal oxide	R518, 618	1-242-689-11	4.7 k
R311	1-202-525-11	10 $\frac{1}{2}$ W composition	R519, 619	1-242-677-11	1.5 k
R312	1-242-683-11	2.7 k	R520, 620	1-242-721-11	100 k
R313	1-246-673-11	1 k	R521, 621	1-242-719-11	82 k
R314	1-242-709-11	33 k	R522, 622	1-242-701-11	15 k
R315	1-202-693-11	6.8 k $\frac{1}{2}$ W composition	R523, 623	1-242-723-11	120 k
R401	1-244-669-11	680	R524, 624	1-242-695-11	8.2 k
R402	1-242-721-11	100 k	R525, 625	1-210-850-11	300 $\pm 2\%$
R403, 404	1-242-705-11	22 k	R526, 626	1-242-705-11	22 k
R405	1-242-637-11	33	R527, 627	1-242-695-11	8.2 k
R406	1-242-681-11	2.2 k	R528, 628	1-210-855-11	33 k $\pm 2\%$
R407	1-242-669-11	680	R529, 629	1-210-855-11	33 k $\pm 2\%$
R408	1-242-709-11	33 k	R530, 630	1-210-852-11	5.6 k $\pm 2\%$
R409	1-242-705-11	22 k	R531, 631	1-242-601-11	1
R410	1-242-701-11	15 k	R532, 632	1-242-701-11	15 k
R411	1-244-633-11	22	R533, 633	1-242-719-11	82 k
R412, 413	1-244-705-11	22 k	R534, 634	1-242-713-11	47 k
R414	1-244-723-11	120 k	R535, 635	1-242-727-11	180 k
R415	1-244-709-11	33 k	R536, 636	1-242-727-11	180 k
R416	1-244-665-11	470	R537, 637	1-242-637-11	33
R417	1-244-709-11	33 k	R538, 638	1-242-721-11	100 k
R418	1-244-723-11	120 k	R539, 639	1-242-653-11	150
R419	1-244-713-11	47 k	SWITCHES		
R420	1-244-697-11	10 k	S1, 2	1-514-976-00	slide, record/playback

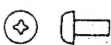
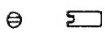
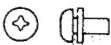


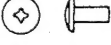

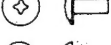

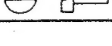
<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
S3	1-513-273-00	slide, timing	ME101, 201	1-524-078-21	meter, level
S4	1-516-128-00	lever slide; TAPE SELECT		1-534-587-11	cord, power (AEP)
S5	1-516-126-00	lever, LIMITER		1-534-487-22	cord, power (General Export)
S6	1-514-415-21	slide, HEADPHONE LEVEL		1-536-179-11	terminal strip, 1-L-1
S7	{ 1-514-472-21	seesaw, POWER (AEP)		1-536-180-00	terminal strip, 1-L-2
	{ 1-514-655-31	seesaw, POWER (General Export)	CP 1	1-464-015-00	bias osc unit 1-464-015-00
S8	1-516-126-00	lever, DOLBY	LPF 1	1-231-219-00	encapsulated component, low pass filter
S9	1-514-478-00	slide, SELECTOR			
S10	{ 1-514-472-21	seesaw, frequency (AEP)	CP 2	{ 1-231-057-31	encapsulated component, CR (AEP)
	{ 1-514-655-31	seesaw, frequency (General Export)		{ 1-231-057-00	encapsulated component, CR (General Export)
S11	1-514-266-00	leaf, STOP	RPH	8-821-936-20	head, record/playback: (PF133-3602)
S12	1-514-266-00	leaf, PAUSE	EH	8-825-836-05	head, erase; (EF110-36E)
S13	1-516-134-00	leaf, fast forward	M	8-831-414-02	motor, HC-414B
S14	1-514-880-00	leaf, rewind	PM 1	1-454-096-00	solenoid
S15	1-516-133-00	slide, MEMORY	FG 401	1-452-071-00	ferrite magnet ring
S16		COUNTER, included in tape index counter	F1	1-532-066-00	fuse, 400 mA (AEP)
<u>JACKS</u>			F2	1-532-275-00	fuse, 160 mA (AEP)
J1, 2	1-507-275-00	M-7A, MICROPHONE	F3	1-532-275-00	fuse, 160 mA (AEP)
J3	1-507-282-00	binaural, HEADPHONE	F4	1-532-284-00	fuse, 630 mA (AEP)
	1-507-901-02	jack nut (A)	F5	1-532-079-00	fuse, 160 mA (AEP)
CNJ1	1-507-142-00	phono (2 p); LINE IN		1-533-027-00	holder, fuse (AEP)
CNJ2	1-507-142-00	phono (2 p); LINE OUT	F	1-532-132-11	fuse, 0.5 A (General Export)
<u>MISCELLANEOUS</u>				1-533-007-00	holder, fuse (General Export)
PL 1 ~ 5	1-518-129-31	lamp, 4.5 V 40 mA		1-509-359-00	connector, REC/PB
			VS	{ 1-509-482-00	socket, voltage selector (AEP)
				{ 1-509-427-00	socket, voltage selector (General Export)

SECTION 7

HARDWARE

<u>Part No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Description</u>
SCREWS		WASHERS	
All screws are phillips type (cross recess type) unless otherwise indicated. (-) : slotted head.		7-623-105-12	2 mm dia (middle)
7-621-255-25	P 2 x 4	7-623-107-02	2.6 mm dia (small)
7-621-255-35	P 2 x 5	7-623-107-12	2.6 mm dia (middle)
7-621-255-45	P 2 x 6	7-623-108-12	3 mm dia (middle)
7-621-259-15	P 2.6 x 3	7-623-205-22	2 mm dia, spring
7-621-259-25	P 2.6 x 4	7-623-207-22	2.6 mm dia, spring
7-621-259-35	P 2.6 x 5	7-623-208-22	3 mm dia, spring
7-621-259-45	P 2.6 x 6	NUTS	
7-621-710-29	(-) SCM 2 x 3, set	7-622-108-02	3 mm dia
7-621-710-56	(-) SCM 2 x 6, set	7-622-308-12	3 mm dia
7-621-714-18	(-) SCM 1.7 x 3, set	LUG	
7-621-773-86	B 2.6 x 4	7-623-508-11	3 mm dia, egg type
7-621-773-89	B 2.6 x 3	RETAINING RINGS	
7-682-146-01	P 3 x 5	7-624-102-01	E-1.5
7-682-148-01	P 3 x 8	7-624-104-01	E-2
7-682-149-01	P 3 x 10	7-624-106-01	E-3
7-682-150-01	P 3 x 12	7-624-122-11	C-1.5 (C type)
7-682-249-20	K 3 x 10, polycarbonate (AEP)	STEEL BALL	
7-682-548-01	B 3 x 8	7-671-112-01	2 mm dia
7-682-646-01	PS 3 x 5		
7-682-648-01	PS 3 x 8		
7-682-649-01	PS 3 x 10		
7-682-650-01	PS 3 x 12		
7-682-946-00	PSW 3 x 5		
7-682-953-00	PSW 3 x 20		
7-685-145-21	P 3 x 6, self tapping		
7-685-545-23	B 3 x 6, self tapping		

Hardware Nomenclature

P - Pan Head Screw 	SC - Set Screw 
PS - Pan Head Screw with Spring Washer 	E - Retaining Ring (E Washer) 
K - Flat Countersunk Head Screw 	W - Washer
B - Binding Head Screw 	SW - Spring Washer
RK - Oval Countersunk Head Screw 	LW - Lock Washer
T - Truss Head Screw 	N - Nut
R - Round Head Screw 	
F - Flat Fillister Head Screw 	

- Example -	
